The Electrical Industry's Weekly Magazine

June 4, 1956

Electrical World

Price 35 Cents

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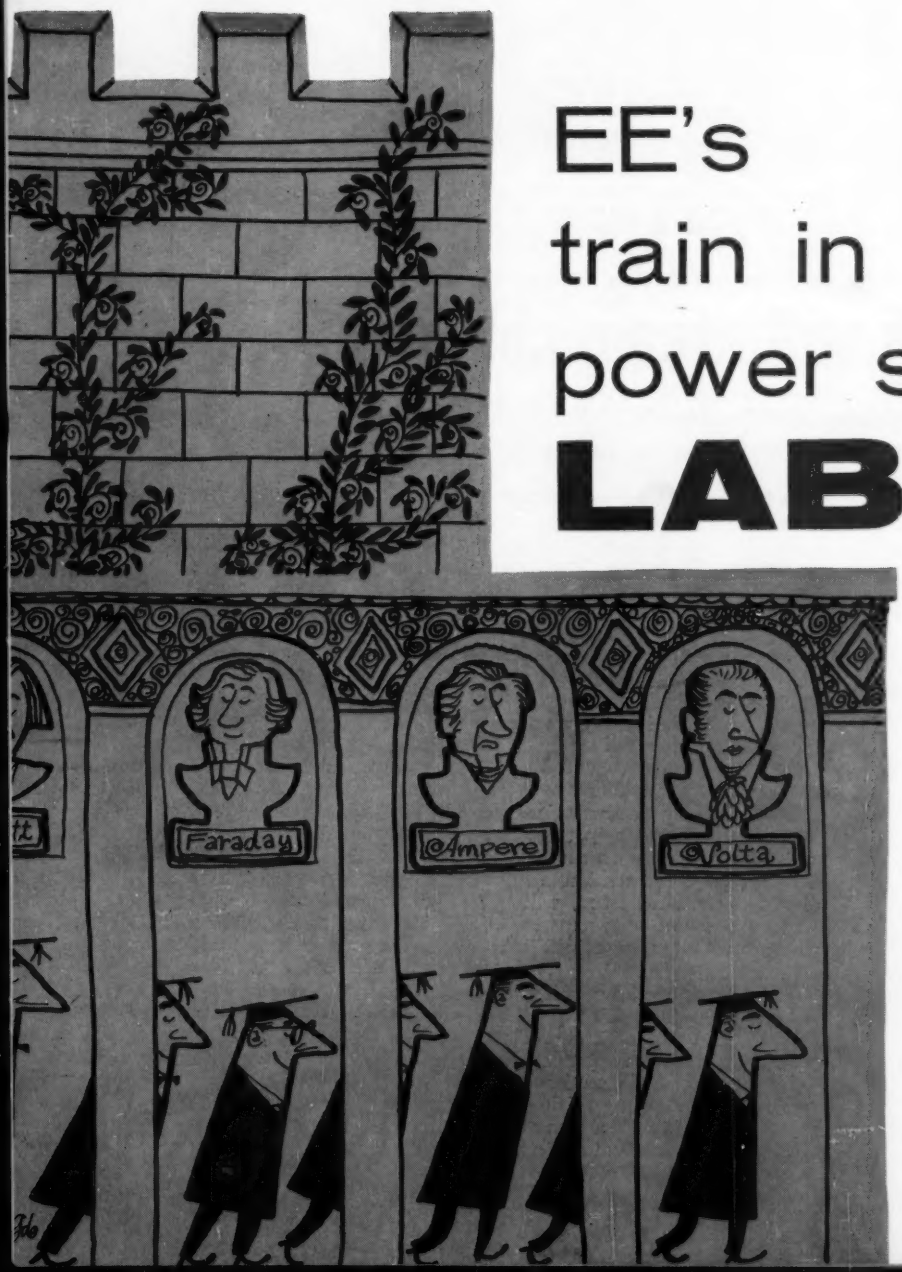

EE's train in power systems **LAB**

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UNIVERSITY MICROFILMS 1
313 N 1 ST
ANN ARBOR MICH

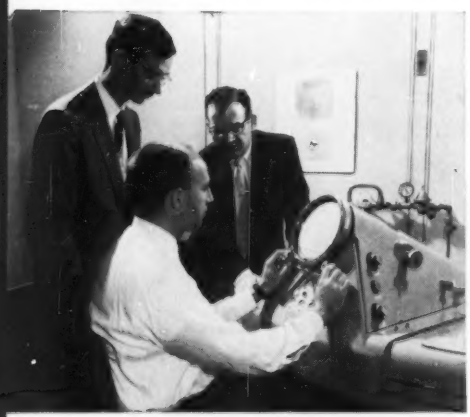
VALUABLE DATA is being supplied at G.E.'s Turbine-Generator Development Laboratory through full-scale testing of turbine and generator components. Above in the Laboratory, E. H. Miller, J. E. Downs, and C. E. Kilbourne, all of G.E.'s Large Steam Turbine-Generator Department, discuss plans to implement additional low-pressure steam path design concepts—a significant area of improvement in large size steam turbine-generators.

System economics pose the question—

How high will steam conditions go?

Knowledge gained from 4500 psig—1150 F developmental unit, and orders for machines up to 450,000 kw indicate the limit is still a long way off

The electric utility industry, confronted with spiralling fuel and labor costs, will watch with interest, the performance results of the first super-critical pressure turbine now being installed at American Gas & Electric System's Philo Station. Steam conditions are 4500 psig, 1150 F/1050 F/1000 F as compared with conventional conditions of 2400 psig, 1050 F of large units now going into service. Technical know-how gained from this developmental unit is already being applied, and considerable industry attention is now being focussed on several turbine-generators recently ordered having initial steam conditions of 3500 psig, 1050 F, with double reheat at 1050 F.



CONTINUING METALLURGICAL STUDIES are developing steels to handle tomorrow's steam conditions. Here, D. L. Newhouse, W. C. Hagel, and A. W. Rankin study materials used in supercritical pressure components of American Gas & Electric's No. 6 unit at the Philo Station.

These major technological advances promise to help the utility industry capitalize on margins for improvement still available in the steam cycle. Each, too, will provide significant answers to the question: "How high will steam conditions go?"

It has long been recognized that lower fuel consumption per kwhr through the use of higher steam pressures, higher temperatures and the reheat cycle is an important means of offsetting rising fuel costs. According to a recent G-E study, significant fuel savings appear possible from further increases in pressure and temperature up to 10,000 psig, 1450 F.

At General Electric, engineering developments in metallurgy and turbine-generator designs are under way to make possible new steam cycle advances and to help utilities meet the need for increased system efficiency. Progress must also be made in further development of those components affected by steam conditions to help make such machines engineering practicalities.

While percentage heat rate gains are smaller, the over-all dollar value of the fuel savings in large size units would be even greater than in the past, assuming a continuation of historic trends in fuel costs.

A copy of the recent study on advanced steam conditions, "Margins for Improvement of the Steam Cycle," may be obtained by writing General Electric Company, GER-1070, Schenectady 5, N. Y.

301-299

MORE POWER TO AMERICA

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ELECTRICAL WORLD

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

VOL 145 No 23 **June 4, 1956**

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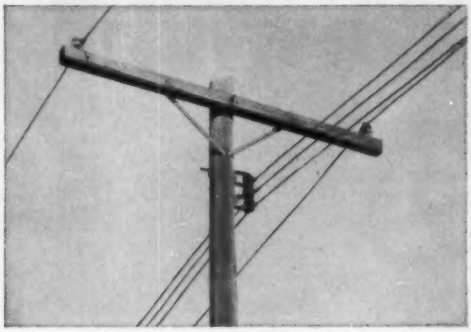
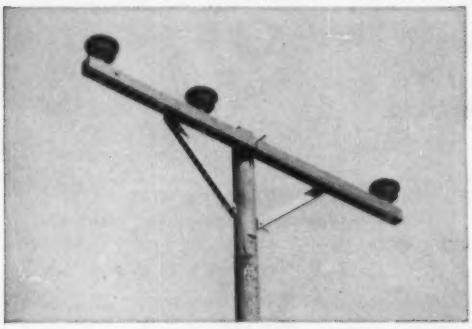
• • •

COMING NEXT WEEK—With electric suppliers spending millions for supplies and equipment, purchasing and stores departments take on added importance. That is why EW will devote 16 pages of the next issue to Modern Stores Management.

IN 1939, the first pressure-creosoted crossarms were installed on poles of the Monongahela Power Company.



IN 1956, because of past performance records, pressure-creosoted poles and crossarms were standard specification for Monongahela.



IN 1936, the first pressure-creosoted poles were installed on Monongahela lines. Mr. Wayne Lawler, Special Representative Transmission and Distribution, points to the dating nail on this still serviceable veteran.

Here's Proof of Performance...

"Pressure-creosoted poles and crossarms provide us with lowest annual cost of any available timber."

The Monongahela Power Company, Fairmont, West Virginia, first used pressure-creosoted poles in 1936. Today they serve 200,000 customers in an area of 12,596 square miles and have 307,000 utility poles, of which 252,000 are pressure-creosoted. Some of these poles are in use on a 1560-mile line which carries 22,000 to 132,000 volts. The power requirements in this part of West Virginia have doubled during the past 10 years.

Mr. S. S. Russell, Senior Lines Engineer, explains why Monongahela Power has standardized on pressure-creosoted poles in sizes of 60 feet and less. "This practice has been established because the performance of creosote treated structures has exceeded the predictions upon which its use was commenced in 1936. On our new 13-mile, 33,000-volt line in Pendleton County, W.Va., we are using pressure-creosoted poles and crossarms exclusively."

United States Steel will be happy to give you more data on pressure-creosoting with USS CREOSOTE. Just get in touch with our nearest Chemical Sales Office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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SALES OFFICES IN PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SALT LAKE CITY AND FAIRFIELD, ALA.

UNITED STATES STEEL

EDITORIALS

OVEC's Neighbors Came to Call

Calling on a new neighbor is a time-honored custom. But those who called on Ohio Valley Electric Corp during its plant dedication and open house a few days ago will long remember their visit. For they saw two of the most impressive generating plants ever built. They saw 11 of the world's largest boilers burning coal at a rate of 7½ million tons per year. They saw 11 giant turbine generators pushing out 2 million kw. And they saw six towering stacks, three higher than Washington Monument.

Completion of this 2,365,000-kw power system 3 years and 7 months after the site had been selected for its 2-million-kw load stands out as one of private power's greatest achievements. OVEC and its 15 sponsoring utilities have earned the nation's gratitude. Messages and speeches from many government spokesmen acknowledge this. Yet OVEC, in a dignified program, dedicated its two generating stations "to the service and defense of this nation."

Service was the spirit which enveloped the dedication. Service was stressed in the oratory which plays its part in every dedication. Service was personified by the employees who cheerfully escorted several thousand guests and patiently answered their questions. And service was exemplified in the strictly functional layout of the plants they visited.

Many of these callers were townspeople—high school bandsmen, national guardsmen, delegates from local government and schools. These townspeople rubbed shoulders with leaders of the utility industry. They must have been bewildered by what they saw. But OVEC's hospitality could not fail to convince them that the power industry is in business to serve the people.

Electric House Heating Gains New Stature

The new manual on house heating design just published by the National Electrical Manufacturers Association promises to be a powerful aid to electric heating. Compiled by NEMA's 19-member Electric House Heating Equipment Section, the new manual gives the industry its first authoritative guide. It resolves problems that have long retarded this industry's growth. It answers such questions as:

1. What is the proper amount of house insulation for satisfactory electric heating?

2. How should heat loss be calculated?

3. What is the basis on which to select the best heater size for a heating job?

4. What is the most dependable way to estimate operating cost?

The new manual presents recommendations on these and other points. Production took two years. But the manual created by this effort should do much to clarify the many controversies and inconsistencies which have haunted electric house heating. It should also promote a more uniform and orderly development of the market.

Utilities will find the manual a great help in shaping heating policies, guiding engineering design, and molding customer-dealer relations. The manual's existence is a good indication that the electric house heating business is gaining stature. The fact that competitors can pool their talents for mutual benefit augurs well for more constructive and effective selling in the days ahead.

Engineering Education Begins in Junior High

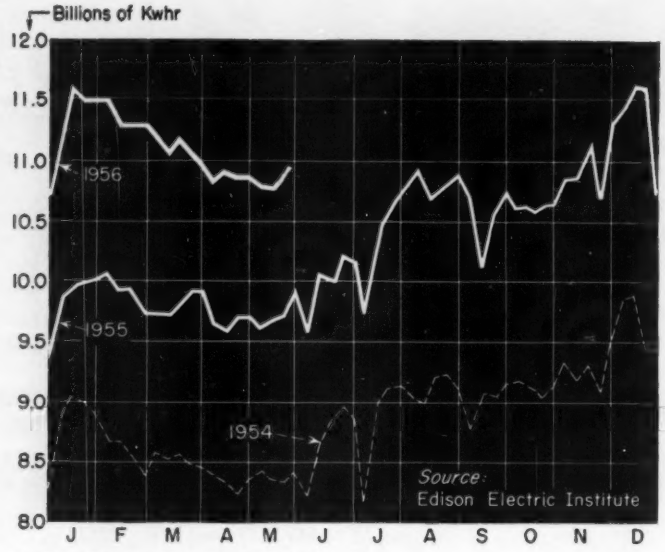
In its campaign to relieve the appalling shortage of engineers, American industry, electric companies included, has been centering its efforts on high school seniors. Worthwhile as such efforts have been, they cannot appeal to students whose high-school studies would not admit them to engineering college.

College preparation for many youngsters begins in junior high. There they begin to select the courses which influence their later education. If industry is ever to have an ample supply of engineers, it must appeal to these eighth graders to take all the mathematics and science their school system can offer. Then, when they complete high school, they will be prepared to study engineering.

Industry must aim its shots lower. It must get the new crop of high-school freshmen to take the right courses. Then time and the colleges will erase the shortage of engineers.

ELECTRICAL WEEK

LAST MINUTE



OUTPUT

Week ended May 26
10,927,000,000 Kwhr
Up 9.5%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 6.8%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
May 26	+9.5	+7.3	+2.6	+13.0	+8.4	+9.4	+14.4	+13.5	+10.6	+7.5
May 19	+11.8	+11.3	+7.7	+16.9	+9.3	+11.0	+14.1	+12.3	+12.3	+5.3
May 12	+12.0	+11.3	+7.3	+16.9	+10.4	+9.8	+11.8	+14.6	+15.5	+10.6

Seasonally Adjusted Index 214.1 Week Ago 214.9 Year Ago 195.9

Issue's Highlights . . . Utilities, manufacturers, AEC officials attack Senator Gore's bill for federal peacetime atomic power development; private projects upheld instead . . . 4-million-kw hydro project for Yukon and British Columbia pronounced economically feasible . . . 39 manufacturers plan to support Live Better Electrically load-building program, EW survey shows.

Fred A. Seaton is nominated as Secretary of Interior. If approved by Senate, the former Republican Senator from Nebraska will fill the post vacated seven weeks ago by Douglas McKay who left to run for the Senate seat held by Wayne Morse (D-Ore.). Seaton, now on White House staff as assistant to the President, pledges to back basic Administration policies on power and water resources, including the partnership policy.

Focal point of EEI's 24th Annual Convention is Colonel Howard Sharp Bennion. Nearly 4,000 persons attending the Atlantic City convention beginning June 4 will honor him on his retirement as vice president and managing director of EEI. Louis V. Sutton, president of Carolina L&P, will hail Col Bennion's services to the industry. His portrait will also be unveiled.

National Electrical Week will be observed in 1957 from Feb. 10 to 16, according to an announcement by M. E. Skinner, chairman of the National Electrical Week Committee and vice president of Union Electric Co. NEW was promoted this year for the first time as an all-industry nationwide event.

Net income is up 11.8% in first quarter of 1956 over same 1955 period for 75 operating electric utilities reporting to EW. South Atlantic region has 20.1% increase, West South Central 18.8%, Pacific 17.2%, and West North Central 16.3%. Leading the 75 is Central Louisiana Electric with 44.6% net income boost, while Long Island Lighting's net is up 39.3%.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire . . . As anticipated, **President Eisenhower nominates** David A. Hamil, speaker of Colorado House, as Rural Electrification Administrator . . . **FPC orders investigation** to determine whether private projects of City of Martinsville and Virginia E&P on Roanoke and Smith Rivers will benefit from John H. Kerr and Philpott projects upstream.

As Gore hearings progress (p 8), here is the latest. Con Ed's VP **J. F. Fairman** declares: "If the purpose is to incorporate new reactor concepts, you will undoubtedly inquire whether construction of additional large power reactors will meet that objective or whether it would not be preferable instead to expand the commission's research program." . . . **Alfred Iddles,** president, Babcock & Wilcox: "Construction of duplicates of civilian reactors already under way would not be an economical or advantageous use of manpower, critical material . . . and money . . . Most progress is made in a field as complex as this by coordination of . . . organizations and agencies involved and by extrapolating from the unknown in a logical way."

First of two atomic piles begins work at British Atomic Energy Authority's Calder Hall atomic power station. First electricity will be generated in few weeks, but plant will not be on full power until later.

Union representation by IBEW is turned down by employees of Black Hills P&L, S. D., with vote of 62% against and 38% in favor of union. This is second time employees reject the IBEW; the first was in April 1955 when vote was 55% against and 45% for the labor group.

Electric rate increase of $50,522 a year net is asked of Wyoming PSC by Montana-Dakota Utilities Co. This would bring rate of return to 6.47% as against 4.82%. Hearings will probably be held during second week of June.

EEI decides to undertake survey of research work being done by member companies. Project will be conducted by Howard P. Seelye, retired manager of engineering, Detroit Edison. EEI's Research Projects Committee, chairmaned by C. W. Franklin of Consolidated Edison, will direct the project.

ABOUT PEOPLE IN THE INDUSTRY

Progress of Power Reactor Development Co's nuclear plant is aired by W. L. Cisler, president, Detroit Ed, at Gore bill hearings (p 8): 150,000-kw turbine-generator is ordered from Allis-Chalmers; $8 million is already spent on conceptual design; $2 million of full-scale reactor parts are ordered; plant site is being prepared; Commonwealth Associates and United Engineers & Constructors are retained as engineers.

The House is "not likely" to accept the Senate-passed Lehman bill, declares Sen Irving M. Ives (R-N. Y.). Consequently, he adds, another Congress will "have to start over again on the Niagara power question." Senator Ives insists "Congress should not be imposing on New York State a method of developing the Niagara project as long as there is any possibility that the parties in interest can get together."

More News About People page 36

CEI's ELMER L. LINDSETH

Industry Leaders Score Senator Gore's Atom Bill

- **Proposal for more government peacetime atom projects attacked before joint Congress unit**
- **Utilities, manufacturers, AEC officials say government program offers no more than private**

Utility industry representatives and representatives of those segments of the manufacturing industry engaged in peacetime atomic power development generally agreed last week that the government should not undertake to build additional nuclear power reactors.

Their views were put before the Joint Congressional Committee on Atomic Energy which was holding hearings on a bill (S2725), sponsored by Sen Albert Gore (D-Tenn.), which proposes that the federal government build six nuclear power reactors.

On the other hand, there was support for the Gore measure from representatives of labor, electric power co-ops, and public power groups.

Need for Kw Increase Stressed

Gore argued that the U. S. is "losing the race for construction of industrial and civilian atomic power reactors." The senator, a consistent supporter of government expansion in the power field, added that "we need kilowatt capacity because we need to have reactors in operation." He contended that this is not a "public power versus private power fight", and that he was "not critical of private enterprise."

But, he said, "the government can do the job faster. The government, representing the whole people, can assume a greater economic risk than can any one company or group of companies."

Elmer L. Lindseth, president of Cleveland Electric Illuminating Co and member of Edison Electric Institute committee on atomic power, testified in opposition to the Gore bill.

Lindseth listed these reasons:

1. The investor-owned utility companies have been and are making adequate progress in the development of nuclear power.

2. The projects industry already is undertaking will demonstrate the practical value of power reactors for industrial or commercial purposes, which is the stated purpose of S2725.

3. The U. S. can maintain world leadership in this important field through continued emphasis on quality and without resort to a "crash" quantity program.

4. Because the preference clause would prevail, S2725 would discriminate against the great majority of America's electric customers receiving service from investor-owned utilities.

5. Contrary to previous testimony before the committee, the government-built reactors would not in any sense serve as a fair "yardstick" by which to measure atomic power costs.

Strauss Disputes Bill's Goal

The Atomic Energy Commission also argued that the Gore bill would not add anything to present atomic power progress. Chairman Lewis L. Strauss pointed out that "our present goal is more scientific knowledge, not simply more kilowatts. . . . We believe the forced adoption of arbitrary goals of kilowatt capacity or numbers of full-scale reactors for an early date, such as 1960, is unwise because it would divert scarce technical skills from activities which promise greater results in subsequent years."

Strauss added, "The mere numbers of kilowatts of capacity to be in existence by 1960 is not, in our view, very meaningful."

The AEC chairman also argued that "we are not behind any country" in the development of nuclear power.

Walker L. Cisler, president of Detroit Edison Co, and a member of Power Reactor Development Co which is undertaking a 150,000-kw nuclear power project near Monroe, Mich., also opposed the Gore bill.

"From my experience and knowledge of the situation, I am certain that the claims that we are being outdistanced by others in atomic power development are based largely upon somewhat fertile and purposeful imaginations," said Cisler. The Detroit executive was U. S. delegate to the Geneva Atoms-for-Peace Conference.

The Gore bill, Cisler said, "provides absolutely nothing that cannot be accomplished better under the existing law. It would serve no constructive purpose, it would be wasteful of tax-

SEN ALBERT GORE

payers' money, and it would contribute nothing helpful in the international situation."

Robert McKinney, editor and publisher, Santa Fe, N. M., and chairman of the citizen's panel which reported to the joint committee on the impact of the peaceful uses of atomic energy, proposed construction of nuclear reactors abroad, rather than in U. S.

The publisher expressed the hope that the committee "will not cause the building of a lot of atomic power plants, just for us to look at, brag about, and subsidize. The nation is confident that this committee will keep the scientific, engineering, and technical problem of harnessing the atom separate from unrelated political controversies."

Added Tax Burdens Foreseen

If the government built additional reactors here, said McKinney, it would involve "two new burdens on all the taxpayers of the nation":

1. Heavy initial outlays of capital expenditures to build plants which never can be amortized.

2. Continuing outlays to subsidize deficit operations for perhaps 20 to 40 years.

Philip Sporn, president, American Gas & Electric Co, analyzed in detail present technological progress with certain reactor types in the U. S.

The country's best interests could be served better by continuing to encourage private industry in its work, and the Gore bill would tend to discourage non-federal initiative, he said. Sporn also expressed fear that the Gore bill would mean a "wasteful drain on engineering and other technical personnel."

Delay in Industry Growth Feared

Charles E. Oakes, president of Pennsylvania Power & Light Co, testified that the Gore bill "is a significant step towards blocking the normal future growth of the electric industry through pre-emption by government of the nuclear power field and interposition of the insurmountable barrier of tax-free government power."

William Webster, president of Yankee Atomic Electric Co, argued that "a crash government program would substantially supersede the civilian reactor program by diverting our limited supply of technically capable men from the efforts already underway."

Francis K. McCune, vice president, General Electric Co, said he believed that the Gore bill "would even more heavily tax us in the already preponderant and growing government effort."

"Much more important, however, I believe, would be its effect on the manufacturer's long-range plans," McCune said. "A key factor in successful business—almost the key factor—is arriving at the proper market place with the proper goods at the proper time. This takes long-range planning—and spending based on that planning," he said.

C. H. Weaver, vice president, Westinghouse Electric Corp, said, "Technical problems are still our greatest concern in the full development of atomic power. Their solution requires not just money and facilities, but also that very scarce commodity—qualified technical manpower. We must avoid spreading ourselves so thin that advancement . . . is sacrificed to an expediency not consistent with the (nation's) true needs."

Strong opposition to the measure also came from W. E. Kelley, president of Walter Kidde Nuclear Laboratories, Inc, who appeared on behalf of the National Association of Manufacturers.

Kelley disputed the argument that the U. S. is losing "leadership" in nuclear power development, and said "it appears to us that when nuclear power becomes economic, the quantities in terms of plants and generating capacity will take care of themselves." Kelley also cited the technical manpower shortage.

A final point, he said, concerned the development of sources of electric power by private competitive enter-

(Continued on page 10)

Hooven Honors British IEE Officers

Visiting executives of the Institution of Electric Engineers in Great Britain were honored recently at a luncheon given by Morris D. Hooven (right), president of American Institute of Electrical Engineers, at the Engineers' Club, New York. Other guests included presidents and secretaries of American engineering societies and other prominent engineers.

Sir George Nelson (left), president of IEE and an engineering executive of English Electric Co, Ltd, and W. K. Brasher, IEE secretary, also visited AIEE headquarters enroute to Montreal where they will attend the annual meeting of the Engineering Institute of Canada.

Yukon Hydro Project Okayed

Frobisher-Ventures confirms economic feasibility of vast 4-million-kw development in Yukon and British Columbia

The "economic feasibility" of the huge Frobisher-Ventures metallurgical-power project for northern British Columbia and the Yukon now has been confirmed.

First progress report in many months on the estimated $700-million project has been given by Frobisher, Ltd, one of the principals in the vast holding group backing the project through the subsidiary Northwest Power Industries, Ltd.

The scheme, one of the biggest in the world ever undertaken by private industry, will reach the "design stage" at the end of this year.

The scheme has been catalogued in two phases: (1) Development of 3,700,000 kw in the Yukon-Taku Rivers unit, and (2) development of 337,500 kw on the south Nass River.

Although the bigger Yukon-Taku project, which will harness the Yukon River's intricate system of inland waterways, has been stalled by international power development complications, construction on the $50-million Nass River unit can start anytime.

The Yukon-Taku unit will be located east of the Alaska Panhandle which bars it from tidewater. Construction there must await resolution of the Panhandle and international power issues now facing Canada and the United States.

Nass River phase is entirely within British Columbia, so it faces no international obstacles.

Despite these delays, however, the Frobisher report said both phases of its project will be brought to the design stage. The machinery, dams, and turbines will be designed and presumably sometime in 1957 orders will go out to world manufacturers.

The Nass unit, said the report, "is capable of early construction without delays caused by international negotiations." It could later be integrated with the bigger northern unit, or operate independently as a vital power development in the Northwest.

To date $1 million has been spent on engineering studies to determine water volume, dam sites, rock testing, and field surveys. When both units are completed they will be linked by a 360-mile power transmission line over a low-level inland route.

Manufacturers Back LBE Load Building Program

Electric utilities will not be found wanting for support by manufacturers in their "Live Better Electrically" load-building programs. Some 39 makers of electrical appliances and equipment have indicated in an Electrical World survey just completed that they will lend their weight to the program.

While none of them gave specific plans, all said they will tie into LBE through their national advertising and promotion and/or through their local distributors. These are the companies:

Admiral Corp
Allis-Chalmers Manufacturing Co
Amana Refrigeration, Inc
Anaconda Wire & Cable Co
Blackstone Corp
A. B. Chance Co
Conlon-Moore Corp
Cory Corp
Emerson Electric Manufacturing Co
Feddars-Quigan Corp
General Electric Co
Gibson Refrigerator Co
The Hoover Co
Hotpoint Co
Ironrite, Inc
Kaiser Aluminum & Chemical Sales, Inc
Kelvinator Division, American Motors Corp
Kennecott Copper Corp
Landers, Frary & Clark
Lewyt Corp
Motorola, Inc
Norge Sales Corp
Norris-Thermador Corp
Okonite Co
Philco Corp
John A. Roebling's Sons Corp
Sangamo Electric Co
Silex Co
Simplex Wire & Cable Co
Speed Queen Corp
Square D Co
Sunbeam Corp
Sylvania Electric Products, Inc
Toastmaster Products Division, McGraw Electric Co
Wagner Electric Corp
Ward Leonard Electric Co
Westinghouse Electric Corp
Whirlpool-Seeger Corp
Edwin L. Wiegand Co

WWP Bids for Property Owned by Citizens Utilities

Washington Water Power Co has offered $950,000 for Washington state properties of the Citizens Utilities Co of Stamford, Conn. The properties consist of transmission and distribution facilities serving approximately 2,500 customers in small communities and rural areas of parts of Spokane, Stevens, and Pend Oreille Counties. Citizens Utilities now buys its electricity from WWP.

The WWP has asked the Federal Power Commission to approve its purchase proposal. Because of the offer, the city council of Deer Park, a lumber and farming community in northern Spokane County, dropped plans for an election on municipal purchase of Citizens Utilities properties inside the town.

Gore Bill Attacked

(*Continued from page* 9)

prise or by the federal government. "We believe the government's responsibilities should not include competition with its own citizens," he stated.

At the outset of the hearings, Chairman Clinton P. Anderson (D-N.M.) stated the problems involved were as follows:

1. What is the pace of nuclear development, who is determining that pace, and who should be determining it; whose task is it to keep the program moving?

2. What are the technical roadblocks in civilian atomic energy?

3. Does it appear that private atomic power groups will achieve their schedules for prototype development set for 1960-62?

4. If Congress authorizes six or even three reactors, which types should be built and where?

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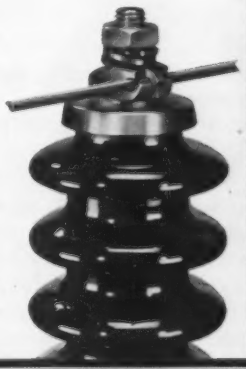

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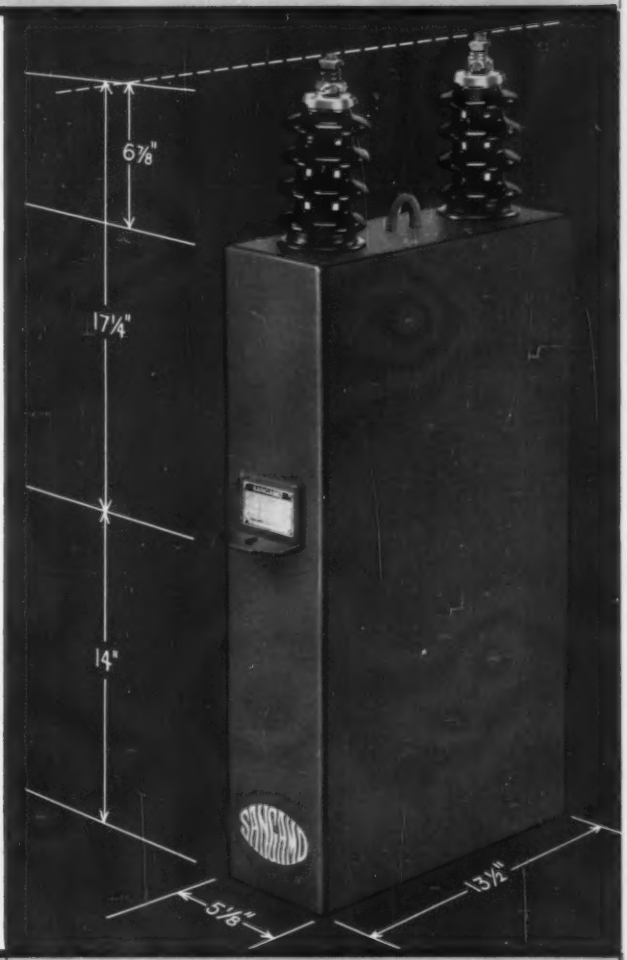

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PC56-3

Take Advantage of Reclosers For Complete Automatic Protection . . .

YOU CAN SAVE

OVER A 5 YEAR PERIOD!

Multiply These Figures By The Number Of Feeders on Your System

Read the article from Electrical World on the opposite page. See how Colorado Central Power Company justified the application of reclosers and sectionalizers. Then multiply these figures by the number of feeders on your system and see how you can save thousands of dollars with reclosers for automatic protection.

Reclosers provide high-speed circuit clearing of faults, then automatically reclose and reset if the fault is transient or non-persistent. If the fault is permanent, the recloser will automatically segregate the faulted tap from the rest of the feeder.

Transient faults are caused by lightning, arrester flashover, or conductors whipping together on long spans. This results in fuse blowing but not necessarily in any noticeable line damage. A trouble man could spend hours looking for a burndown or equipment failure, drive hundreds of miles patrolling the lines—and find nothing.

With reclosers, up to 90% of these transient faults can be cleared, with no significant damage to the system or interruption of service continuity. Ask your L-M Field Engineer for more information on complete automatic protection—single- and three-phase—from substation to load. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ont.

256

LINE MATERIAL Kyle® Reclosers

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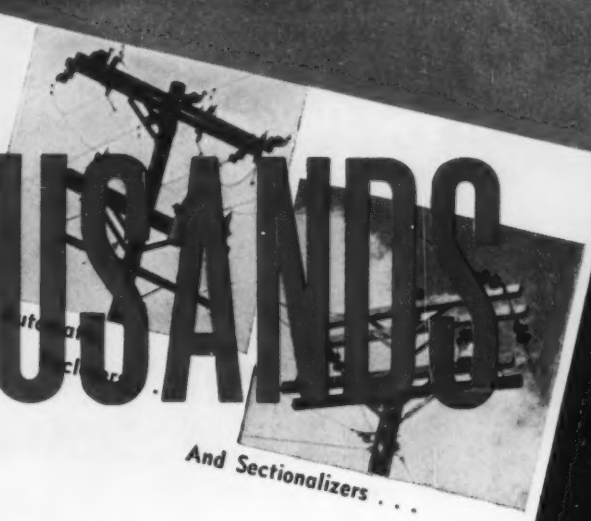


And Sectionalizers . . .

DISTRIBUTION—Design

Prove Automatic Protection Justified

For Rural Area of Colorado Utility

HOWARD S. SMITH, Distribution Engineer, Colorado Central Power Co, Englewood, Colo.

Protection of rural circuits with reclosers and sectionalizers may be justified on an economic basis for circuits having a low energy consumption where transient fuse-blowing requires many man-hours for service restoration. In applying an analysis to 7 and 13-kv rural lines, Colorado Central Power Co finds the key factor is the time spent in restoring service on lines protected with fuses and manual sectionalizing switches.

To determine how much money can be justified for automatic protective devices, this analysis may be used:

1. From field outage reports, separate transient and permanent line outages over a two or three-year period and tabulate as an annual average.
2. Determine man and truck-hours cost for a two or three-year period and tabulate as an annual average.
3. Estimate revenue losses because of outages over a two or three-year period and tabulate as an annual average.
4. If permanent faults are predominant in one area, which has a small load and can be properly sectionalized, the losses in revenue because of improper sectionalizing plus the cost of crew patrolling time should be tabulated on an annual basis.
5. All other costs which can be reduced by reasonable sectionalizing should be tabulated on an annual basis.
6. Evaluation of customer good will, which must be considered, cannot be reduced to a dollar value. However, continuity of service will be a deciding factor if rural load is to continue to increase. The increased revenue based on this intangible factor of good will should more than account for the maintenance of protective devices. It also will allow a margin of economic gain in favor of reclosing devices.

Add the annual costs as determined in items 2-5 and multiply by six. This figure is the amount of money that can be spent for protective devices for the area considered. This calculation assumes an average fixed annual charge of 16⅔% on the investment in protective devices. It also assumes that the economic point of investment is reached when the total cost of outages per year is equal to the fixed annual charge on the investment to reduce outages.

An analysis of the Milliken substation area of Colorado Central Power, shown in the diagram, will illustrate use of this method of [illegible]. Cost of transient and permanent faults, the total [illegible] justified for automatic protection, and the cost of this protection are listed in the table. Note that the allowable economic figure is $1,030 more than the economic figure. Thus the protective scheme is economically sound. Future fault data may justify replacing the fuses to the north of Milliken with reclosers.

Analysis of Economic Automatic Protection

Date from field outage reports:		
1. Transient outages, 18 per year		
80 man-hr @ $5/hr	$400	
50 truck-hr @ $1/hr	50	
3,000 kwhr lost @ $.02/kwhr	60	
Cost of fuse links	10	
		$520
2. Permanent faults, 3 per year		
4 man-hr lost due to improper sectionalizing @ $5/hr	$20	
2,000 kwhr lost due to improper sectionalizing @ $.02/kwhr	40	
		$60
3. Total probable outage cost		$ 580
4. Allowable economic investment ($580 x 6)		$3,480
5. Estimated installed cost of protective equipment*		
11 reclosers @ $190 each	$2,090	
4 sectionalizers @ $90 each	360	
		$2,450
6. Difference in favor of automatic protection		$1,030

*Including installed cost of crossarms and hardware

If you flew into
Ft. Worth tonight...

Your landing would be lighted with power from the world's

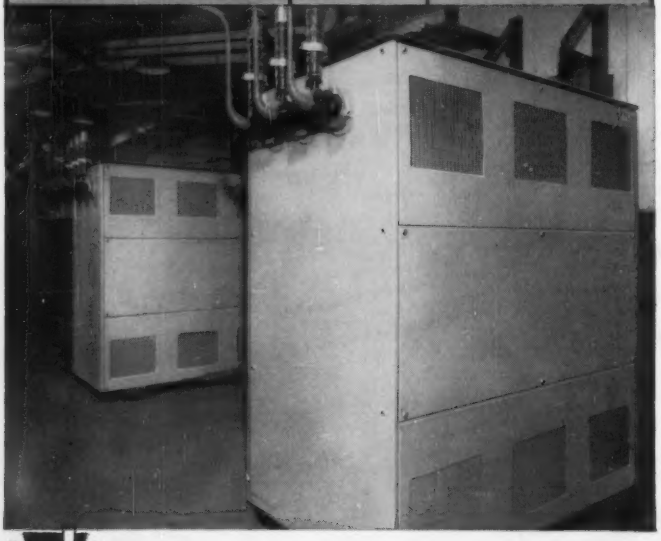
SAFEST DRY-TYPE
TRANSFORMERS

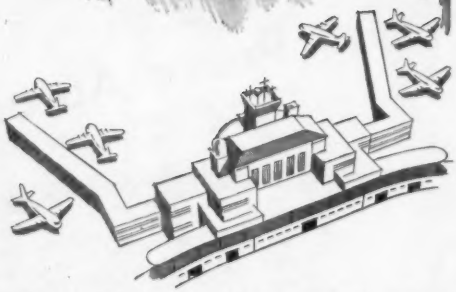
PENNSYLVANIA
Silicone-Insulated
TRANSFORMERS

at Greater Ft. Worth International Airport

are 1000-kva ventilated units, three phase, 60 cycles, 150 C. rise, 12470Y — 480Δ volts. Silicone-Insulated Transformers (formerly known as "Class H", now NEMA Group 3) were pioneered by Pennsylvania. The following types and sizes now are available:

TYPE	KVA	VOLTAGE
Ventilated	Up to 3000	Up to 15 kv
Sealed-in Nitrogen	Up to 2000	Up to 15 kv





Power from two of the world's safest transformers — Pennsylvania *Silicone-Insulated* 150 C. Rise Transformers — would continue to light your way even after you stepped from the plane and entered the terminal building at Greater Ft. Worth International Airport. These two 1000-kva dry-type units are ideally suited for indoor installation because there is *no fire or explosion hazard* as with oil-filled transformers . . . *no risk from toxic fumes as* with Askarel units.

Also important, from the standpoint of public safety, is silicone insulation's *outstanding resistance to moisture* and other potential contaminants — one of the principal reasons for the trouble-free operating records of scores of Pennsylvania Silicone-Insulated units in service throughout the country. Such dependability — plus an *exceptional overload capacity* that can be called on in case of emergency — is of vital importance for the field and terminal lighting system at busy Ft. Worth International Airport.

pt **PENNSYLVANIA TRANSFORMER COMPANY**
A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

MASS GROUNDBREAKING CEREMONY by 100 guests kicks off start of Ohio Edison Co's 370,000-kw plant at Stratton, Ohio

More Kilowatts Slated by Utilities

Signs of the utility industry's expansion, like June, have been "busting out all over."

Some of the budding evidence is shown in the groundbreaking pictures on this page. In addition, Southern Company recently announced a whopping $700-million, six-year expansion plan. Virginia Electric & Power Co followed up with a $43-million plan.

Looming large in the Southern Co plan is a proposed $150-million, 1-million-kw steam plant on the Coosa River, near the Alabama coal fields.

The plant will be built and operated by a new company known as Southern Electric Generating Co in which Georgia Power Co and Alabama Power Co will share 50-50 ownership. The plant will be within easy transmission distance of both utilities who will share equally in the power output.

First installation, expected to be completed in 1961, will consist of two 250,000-kw generators, representing an initial investment of about $75-million. The two additional units of like size are planned for installation by the end of 1963.

The $43-million expansion at Vepco includes an additional 150,000-kw unit, costing about $22 million, at the Portsmouth power station and a similar unit at the Yorktown station.

Capacity at the Yorktown plant, now under construction near the Tidewater Oil Refinery, will be doubled by the new addition. The additional generator at Portsmouth will boost total capacity there to 350,000-kw.

BREAKING GROUND in modern manner is Pres S. C. McMeekin in bulldozer at site of South Carolina Electric & Gas Co's four-unit, 600,000-kw plant

PRES EDWARD SHUTTS wields the spade at construction start of Iowa Southern Utilities Co's third 20,500-kw generating unit at Bridgeport Station

Purchasing and Stores Men Survey Present-Day Practices at EEI Meet

Reports of surveys of practices were the chief interest of the Edison Electric Institute's Purchasing and Stores Committee meeting held May 7-9 at Boston.

Such varied topics as traffic, materials handling, scrap and flyash were studied, reported on and discussed.

This was the work of a number of subcommittees, each of which carefully studied an aspect of purchasing and stores operations. Here are the highlights of these studies.

Project "Stock Control," presided over by E. J. Martin, general superintendent stores, New Orleans Public Service, Inc.

The project "stock control" panel presented stock control methods successfully used by the subcommittee members. Here are the highlights of each method.

Consolidated Edison Co—A Stock Control Bureau receives a weekly machine accounting run-off of all stocks reaching the order point. These are then requisitioned. When an item reaches a "reserve point" (minimum quantity), a low stock report is sent to Stock Control if there is no existing order or to the expediters if an order exists.

Detroit Edison Co—"When to order" is completely mechanized through the use of an "ordering factor." A weekly stock control accounting machine tape for those items which should be ordered is prepared. It shows the quantity on hand, on order, and issues per quarter for one year.

"How much to order" is a manual operation. Control men calculate how much to order through a consideration of balance on hand, past usage, known future usage, and minimum. Plans to mechanize the "how much to order" operation are now being made.

Duquesne Light Co—All stock control, except for abnormal demands, is operated by a system of maximum and minimum quantities based on use, availability, and time factors. Each item has an established order point quantity. When this is reached, the individual responsible for the control of the item is notified.

Illinois Power Co—A revised system of control now being installed will find stores activity reports being submitted to each stores control location from headquarters on a weekly schedule. Active material is replenished on a "time" cycle rather than on a strict "order point" basis.

Public Service Co of Colorado—The storekeeper is personally acquainted with every item in his stock and is in constant contact with the personnel served by his storeroom. As a result he knows of all projects and operations that affect requirements on his stock.

He also receives a semimonthly accounting machine activity report which not only gives him his stock balance but his rate of use on each item. As this report does not reach him until one week after the close of the period covered, he must closely watch his minimum bin stock.

Wisconsin Electric Power Co—Each storekeeper maintains his own records on which all material transactions are recorded. Minimums and maximums are established by the operating department for which the material is carried in stock. A centralized material control group is now being organized better to control ordering of new stock and hold down inventory.

Long Island Lighting Co—Centralized inventory control records are maintained in the Material Control Division. A separate record is maintained for each item for each storage location and consists of the following:

1. Record of purchases and receipts.
2. Activity card (receipts and a weekly summary of usage from accounting machine tabulations).
3. Summarization of usage.
4. Title insert (a code and description).
5. Adjustable signals which indicate status in relation to minimum and order point.

Usage is summarized weekly by accounting machines and is manually posted to the control record. Receipts are posted as they are reported by the storeroom and are "checked-off" when they appear on the accounting machine record. Whenever a posting is made, the balance is compared with the minimum and order point; and the adjustable signals are set to indicate the status of the item in relation to each of these factors. After the posting of the weekly summary of usage, a review is made for ordering and expediting. The adjustable signals point out the items which require immediate attention.

Substorerooms receive weekly replenishment from the Central Storeroom on the basis of control factors established by the Material Control Division.

New Orleans Public Service Inc—Three times a week all material issues are forwarded to the accounting section which prepares a tabulation for each storekeeper. This listing shows receipts, issues, balance on hand, and reordering point.

Each storekeeper is responsible for replenishment of stock. First, he depends upon the stock clerk whose duty it is to check the quantity in each bin with the reordering point when filling an issue. In addition to this an accounting machine tabulation is prepared for the storekeeper. This permits a comparison of the amount on hand with the reorder point.

Virginia Electric & Power Co—The minimum quantity shown on each repeating requisition is one month's use. When the stock on hand in the district storeroom reaches the minimum, a 60-day quantity is requisitioned.

Developing Flyash Outlets, presented by J. B. Homsher, purchasing agent, Gilbert Associates, Inc.

By 1963 it has been estimated that nearly 14 million tons of flyash will be produced annually.

To study the problem of selling flyash, a questionnaire was sent to the members of the Purchasing and Stores Committee. The 32 reporting companies produced 4,390,000 tons of flyash, of which 7½% was sold.

A high percentage of the flyash is being used in concrete or concrete products and for bituminous road surfacing. The prices received for these sales vary from 44¢ to $7 per ton, which includes both bulk and bag shipments.

Six companies are using direct sales, seven are selling through brokers, and two are using other methods.

Eighteen of the companies stated they never expect to be able to sell their full production, and six feel they will eventually sell all they can produce.

One company sells under the Bureau of Reclamation Specifications while four are selling to met the ASTM Specifications C-350-54T.

The sale of flyash for concrete or concrete products is seasonal. Extensive research is being carried on by various companies on the sintering of flyash. This will make possible storage during off-seasons and also make the end product more adaptable for other uses.

When and How Much to Buy, presented by J. F. Estill, Jr, purchasing agent, Houston Lighting & Power Co.

In reply to a questionnaire on "When and How Much to Buy", 20 companies stated that their emergency stock consisted of a 30-day supply. Another 12 gave answers varying from 15 to 120 days.

With one or two exceptions, the answers as to how an emergency minimum was determined added up to "by good judgment based on past experience."

The 46 companies which answered the questionnaire showed limited use of a mathematical formula in determining order quantity. Four companies use it generally, five companies use it on some items, and two companies are experimenting with its use. Another 35 companies make either no use at all or no appreciable use of this method.

Outside of the relatively few companies who are making general or partial use of a mathematical method, the situation can pretty well be summed up by the comments of one member of this group who said, "We like to think we are placing some of our orders on this basis but frankly do not feel we have sufficient information on costs to enable us to order in this manner as yet."

Lack of information on the costs of purchasing and storing is borne out by answers to a question on stores cost, cost of money, taxes, and cost of space.

Because of the number of "no answers," the number of estimated answers, and the great variation in the answers given, it was concluded that such information either is not available or is considered confidential.

Apparently, the lack of adequate information on the cost of making a purchase and on the cost of money, taxes, insurance, space, obsolescence, and deterioration is one of the prime reasons why a mathematical method of determining order quantity, has not been more widely adopted.

In an attempt to find out what practices regarding quantity discount are this question was asked: "How do you take quantity discount into account in determining quantity to order?"

Five companies stated that quantity discount came into play so infrequently that the whole matter was of small consequence. A much more typical answer was that an attempt was made to evaluate the cost of carrying additional material in stock against the savings realized by buying in quantities large enough to entitle us to a quantity discount.

Although a few companies arrive at their ordering quantities by a formula or calculations, most companies arrive at the answer by judgment based on experience.

It is of interest to note that 15% of the companies reporting say that they use blanket orders only as protection against rising prices; 44% consider price protection as only one of several factors influencing them in the use of blanket orders.

There is apparently no uniformity of thinking on the acceptance or rejection of blanket orders. But they do have enough advantages to cause most companies to want to use them at least for some of their purchases. Out of 46 companies which answered the questionnaire, 40 stated that they used blanket orders for all or part of their buying.

Departmental Influence and Interest in Purchases, presented by G. H. Cole, manager of purchases, Alabama Power Co.

Answers to a questionnaire concerned with responsibility and control in various types of purchase transactions showed that the purchasing position in the selection of major equipment was appraised from 0 to 80%.

The Purchasing Departments showed much better position in the medium electrical equipment field, but with considerable variations. And there was shown a still better position for the department, but with still some variation, in selection of sources for light electrical equipment and materials, such as conductors and pole line hardware.

The Purchasing Department position in the selection of insulated cable sources was rather high, indicating a recognition of an increased number of manufacturers in a position to furnish quality cables.

One company reported that while the fundamental responsibility in selecting sources is primarily a Purchasing Department problem, it tries to share the responsibility through the media of standards committees comprised of more than eighty members.

A surprising development of the questionnaire was the few companies which have spelled out the responsibilities of the Purchasing Department and other departments in purchase transactions, through manuals, general orders, or otherwise.

To review whether or not a utility organization is realizing the full potentialities of its Purchasing Department, the committee recommended a check of the following questions:

1. Is your Purchasing Department adequately staffed with qualified personnel to handle the major function of purchasing for your company?

2. Are your key purchasing personnel clothed with adequate authority to carry out the functions of the Purchasing Department?

3. Do you have a manual, general order or directive fully defining the Purchasing Department and other positions in purchase transactions?

4. Do you assure your Purchasing Department leeway for competitive opportunities through materials committees, standards lists, or by other means; and through direction against unjustified exclusive and unduly limited specifications?

5. Does your Purchasing Department have adequate control of vendor contacts and communications?

Dalles Concrete Placement Nears Finish

Concrete placement for multipurpose Columbia River dam, powerhouse, navigation lock, and fishways of Corps of Engineers' Dalles project was 92% complete four years after construction began, according to a recent progress report.

The powerhouse turbine installation, above, is shown from the west end of the 14-unit powerhouse. Reinforcing steel for the powerhouse wall is being erected at right foreground.

Range of completion of various phases varies from the 99% status of the 23-gate spillway dam and its inundated stilling basin to the fractional start of the rock fill closure dam to be completed in August, 1957. Almost all phases of the project, aside from turbine-generator installation and highway and railroad relocation, are either on or ahead of schedule.

The $303-million development may be the last wholly government built major project on the river. Authorized John Day Dam, 25 mi upstream, involves legislative proposals for partnership construction.

Pool Entries See 11% Generation Boost

Total power generation in the United States for 1956 will be over 607-billion kwhr, or about 11% over the 1955 figure if the average of the 438 entries in the 11th annual power generation pool contest is correct.

Robert M. Hatfield, vice president of Combustion Engineering, Inc, and sponsor of the contest, pointed out that the average estimate of 607,-255,000,000-kwhr is 4½% below the generation increase during 1955, but still tops the increases during 1952-54.

According to Hatfield, members of 110 utilities in 41 states plus 50 members of consulting engineering and equipment manufacturing concerns entered the contest. Entries from 53 presidents and board chairmen show an expected load growth of about 12%.

The most optimistic executive predicts a 19% gain during 1956, while the most pessimistic looks for a load growth of slightly more than 3%. From Edison Electric Institute's Prime Movers Committee, 60 entries show an average expected generation of 610.3-million kwhr, or an increase of almost 12% over 1955.

Entries in the 1956 contest number 53 more than last year. The winner will be decided when the 1956 total power generation figure is published in the 1957 Statistical Issue of Electrical World next January.

Early Columbia Runoff May Ease Flood Threat

May runoff, heavier than expected, in the Columbia river may ease the brunt of flood crests forecast for May-June, the U. S. river forecasting center at Portland, Ore., reported as Army Corps of Engineers pushed emergency dike and levee buttressing to completion.

For 12 consecutive days the Columbia was above flood stage at Portland for a new record approached only in the disastrous flood year of 1894. For three weeks prior to May 13 the river has stood five to 12 ft above levels of the same period in the great Memoral Day flood year of 1948.

Flood-wary low-land dwellers were inclined to cross their fingers about river forecaster Elmer Fisher's claim the earlier runoff getting lower elevation snow melt out of the basin would thus ease high Rocky Mountain freshet flow. This collision of lower and higher crests caused the 1948 damage in the lower Columbia.

Grand Coulee and Hungry Horse pools were operating to absorb the flow, but elsewhere all other reservoirs were overflowing. Some hydroelectric capability was lost in the Northwest pool by the high water. Bonneville Power Administration expected it would carry all firm loads through the period, although industries with interruptible energy had been notified that power might be curtailed.

Noting the Columbia runoff, Fisher said 20-million acre ft of flow dumped into the Pacific in April whereas the flow from October through March was 46.5-million acre ft. In the first 10 days of May the flow amounted to 9.1-million acre ft.

Columbia flow in April in second feet at Grand Coulee was 183,300 vs. median year 104,700; Bonneville in April was 355,600 vs. median year 222,200.

Engineering Groups Listed

Engineering Societies Directory which lists all local, regional, and national engineering societies will be published this summer by Engineers Joint Council, E. Paul Lange, EJC secretary, has announced. Copies may be ordered from Lange, 29 West 39th St., New York City. Prepublication price is $3.50.

SECURITY OF YOUR TRANSMISSION LINES depends on reliability and long life of suspension insulator units. In its 40 years, Lapp has made millions of these discs, and never before have we offered so big a dollars-worth in uniformity of mechanical strength, electrical permanence—in assurance of long, trouble-free service on your lines.

STRONG SAND-BANDS make strong insulators. Compression glazing, in which Lapp pioneered, increases the strength of insulator porcelain about 50%. This advantage is largely lost, however, if sand-band areas do not develop the same compression. Lapp meets that problem with "compression sand." This "sand" is true porcelain, but made from a special body with lower coefficient of expansion than the insulator body. The result is that after firing, the fused-on sand-band goes into compression with respect to the insulator shell. Laboratory tests prove the over-all uniformity of Lapp suspension insulator strengths. So do service records on transmission lines the world over.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Easing of Holding Co Act on Big Scale Seen Remote

Electric utility hopes for general easing of the Holding Company Act restrictions are fading. Sen John O. Pastore (D-R. I.) says his bill proposing amendments will undergo sharp "refinement" to apply only to experimental generation of power by atomic reactor.

As originally drafted, the Pastore bill would have exempted from holding company restrictions any companies engaging jointly in a subsidiary firm to finance and operate an atomic generating facility. (EW April 26, p 58).

The original bill got hearty support from the industry but ran into heavy criticism from public power partisans —and from the Securities and Exchange Commission which claims it would seriously weaken the 1935 act.

In the expected revision, Pastore says, exemption from the act would be given to utilities jointly building atomic reactors only during the non-profit period of research and development. The exemption would be withdrawn once the jointly-sponsored reactor starts to produce commercial power.

To this is likely to be added at least one more fairly important exemption of more durable character. There is Congressional sentiment for an added provision that would allow non-electric firms to stay clear of the Holding Company Act even while sharing in atomic development with utility companies that might be subject to the act.

Long Island Lighting Wins Court Fight for 'LILCO'

A Long Island, N. Y., storm window manufacturer has been ordered not to use the trade name "Lilco" because "LILCO has become synonymous with Long Island Lighting Co." The decision was reached recently in Nassau County Supreme Court, Mineola, L. I.

Long Island Lighting, who brought suit against the manufacturer, pointed out that it had invested $825,000 in promoting the name. The defendent, Lilco Manufacturing Corp of Westbury, L. I., has applied for a patent on the name and plans to appeal the case to a higher court.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING MARCH

State	Utility	Plant	Fuel	Capacity
Conn.	Connecticut Light & Power Co	Devon	S	100,000
Ohio	Cleveland Electric Illuminating Co	Eastlake	S	166,400
Ind.	Indiana-Kentucky Electric Corp	Clifty Creek	S	180,000
Minn.	Janesville Municipal Utilities	Janesville	IC	675
N. D.	U. S. Corps of Engineers	Garrison	H	80,000
Kan.	Girard Municipal Light & Water Dept	Girard	IC	1,425
Va.	Potomac Electric Power Co	Potomac River	S	90,000
Tex.	Houston Lighting Power Co	Sam Bertron	S	156,250
Utah	Utah Power & Light Co	Vernal Gas	IC	1,000
Nev.	Southern Nevada Power Co	Clark	S	44,000
Wash.	Bureau of Reclamation	Chandler	H	6,000
Ore.	U. S. Army Engineers	McNary	H	70,000

RETIREMENTS

Ill.	Commonwealth Edison Co	Crawford	S	60,000
Mich.	Consumers Power Co	Grand Rapids	H	400
Wisc.	Wisconsin Public Service Corp	Oshkosh	S	500
Neb.	Imperial Municipal Light & Water Plant	Imperial	IC	100
Kan.	Girard Municipal Light & Water Dept	Girard	IC	173
Tex.	Hearne Municipal Electric Light Dept	Hearne	IC	120
Colo.	Western Colorado Power Co	Durango	S	500
Utah	Utah Power & Light Co	Vernal Gas	IC	240

U. S.	Hydro	Steam	IC	Total
Added	156,000	736,650	3,100	895,750
Retired	400	61,000	633	62,033
Adjustments Plus	.....	134,180	800	134,980
Adjustments Minus	50	2,500	.....	2,550
Net Change	155,550	807,330	3,267	966,147

H—Hydro, IC—Internal Combustion, S—Steam

United States Capacity as of April 1—Hydro, 25,310,261 kw; Steam, 88,886,764 kw; IC, 2,360,516 kw; Total, 116, 557,541 kw.

POWER BRIEFS

● Major portion of Arkansas Power & Light Co's $13.5-million construction budget for this year will be used for rural development, including distribution lines to rural as well as urban customers.

● Alabama Power Co has asked Alabama Public Service Commission for permission to install a supplemental 225,000-kw steam electric generating unit at the Barry Steam Plant near Mobile in order to prevent a power shortage predicted for 1959. The new unit is expected to be in operation that year.

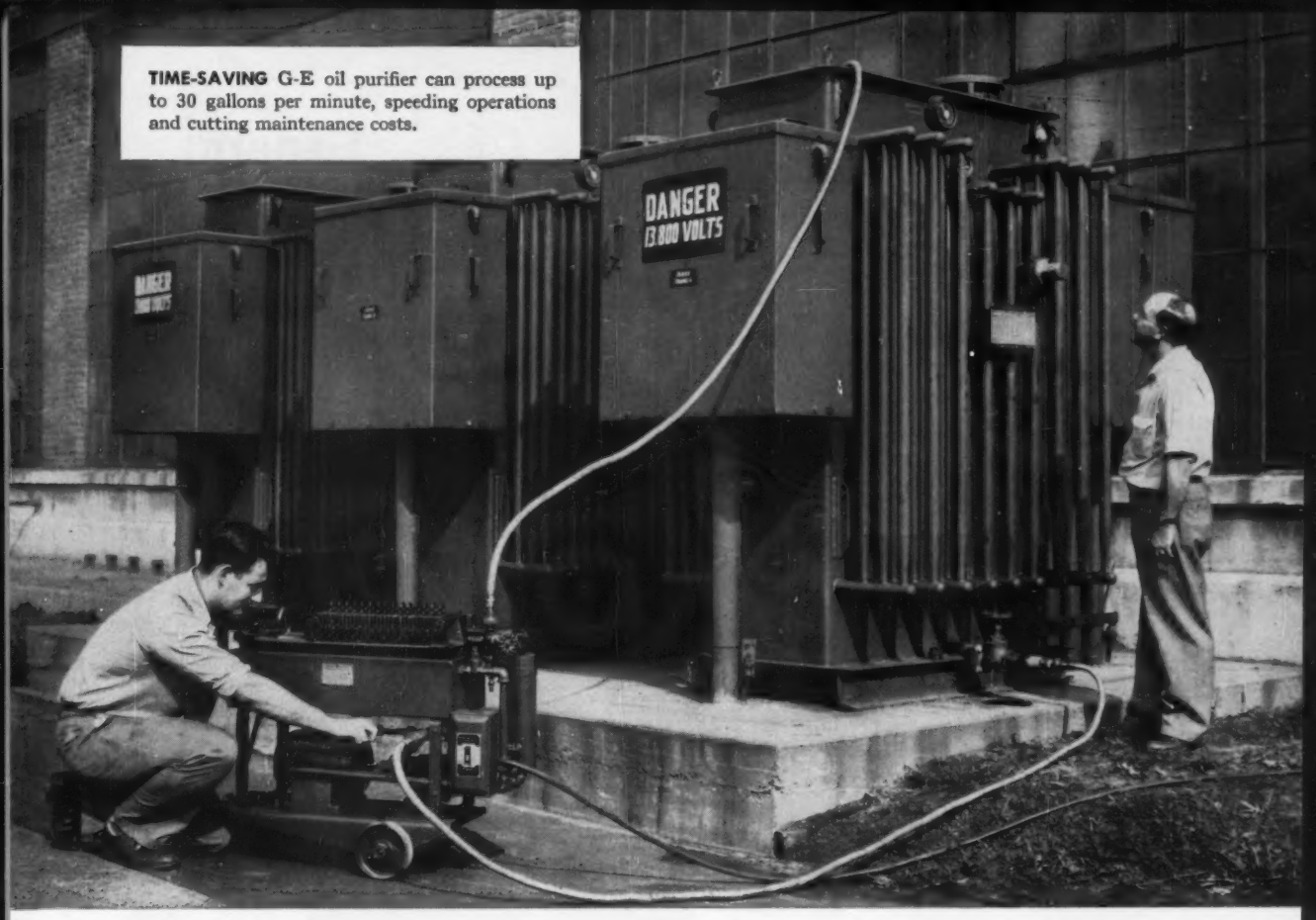
● Engineering work was recently started by Montana Power Co on the $15-million, 63,000-kw Harry Cochrane hydroelectric development on the Missouri River near Great Falls, following receipt of a Federal Power Commission license. The dam, which is planned for 1957 operation, will be a concrete gravity structure creating a 2,700 acre-ft reservoir.

● Army engineers have narrowed the proposed sites for John Day Dam from five to two locations on the Columbia River. One, Scholfield Rapids, is located below the John Day River, and is favored by engineers on a benefit-to-cost ratio basis. Indian Rapids, upstream, is considered best from studies of navigation.

● Cleveland Electric Illuminating Co plans installation of a $37-million, 250,000-kw turbogenerator at its Ashtabula, Ohio, power plant, more than doubling the plant's present capacity. The new unit will be housed in an addition to be built at the present plant, which now contains four 60,000-kw generators.

● Construction work on 205,000-kw unit has begun at Commonwealth Edison Co's Crawford Station in Chicago. The new unit is a major item in the company's $600-million construction program for 1956-59.

● 'Worthwhile" rain-making operations undertaken last fall have prompted Gatineau Power Co, Ottawa, Ont., to try cloud seeding again in its Gatineau River watershed region.



TIME-SAVING G-E oil purifier can process up to 30 gallons per minute, speeding operations and cutting maintenance costs.

Cut maintenance costs with G-E Purifiers

Recondition insulating liquids quickly and easily with this low-cost device

You may be able to cut your maintenance costs in filtering insulating liquids for transformers, regulators, and other electrical equipment by using General Electric purifiers for oil and Pyranol*. The purifiers, which filter out suspended sediment and free and dissolved water, have high capacity, do high-quality work, and are easy to use.

It is important, of course, to filter the insulating liquid when filling a tank for the first time, or when refilling an old tank. Maintenance of dielectric strength is more important today than ever before because many users are ordering transformers with reduced basic insulation levels. If periodic testing indicates a need for filtering, the G-E purifier will do the job, safeguarding equipment life and helping to assure continuous service to customers.

High Capacity—The new G-E oil purifier with 7-inch filter-paper plates has a capacity of 12 gallons of liquid per minute, a 20 per cent increase over other available models. This means rapid filtration, short shutdowns, and low maintenance costs. The model for purifying Pyranol has similar output. Models, using 12-inch filter-paper plates, filter 30 gallons per minute.

High-quality Work—Using adequately dried filter paper, you can normally raise the dielectric strength of oil to be reconditioned to 30 kv with just one pass through the purifier.

Easy to Use—Simplicity of operation saves time in training maintenance crews. Unskilled workmen can easily set up and operate G-E purifiers. The single-phase pump motors operate on 115/230 volts, and the filter-paper drying ovens used in conjunction with the equipment are rated for either 115/230 volts or 230/460 volts. Purifiers and ovens can be quickly connected either to single-phase lighting circuits or to one phase of a three-phase circuit.

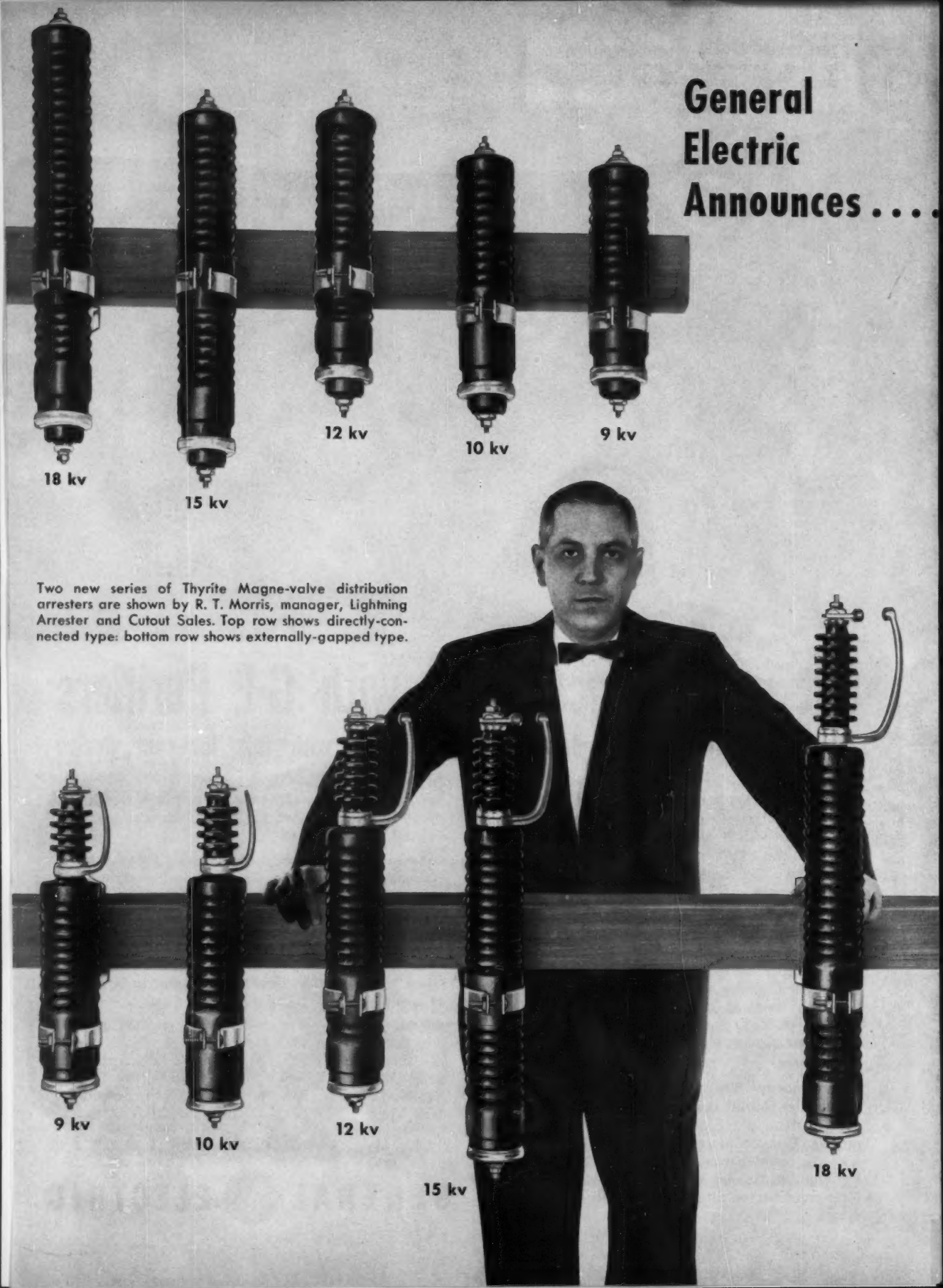
For More Details—For complete information on low-cost G-E purifiers for oil and Pyranol, drying ovens, and filter paper, contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-1333, Section 431-45, General Electric Company, Schenectady, New York.

*Registered trade mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric Announces . . . .



Two new series of Thyrite Magne-valve distribution arresters are shown by R. T. Morris, manager, Lightning Arrester and Cutout Sales. Top row shows directly-connected type: bottom row shows externally-gapped type.

.....A COMPLETE NEW LINE OF MAGNE-VALVE DISTRIBUTION ARRESTERS

Smallest, lightest, valve-type arresters, with a proven operating principle that assures maximum system protection

Intensive General Electric research into improved lightning protection for distribution circuits has now resulted in a new and advanced line of valve-type arresters—the only type that can be applied anywhere on a system regardless of available short-circuit current.

For the first time in distribution arresters, you get the advantages of the exclusive Magne-valve principle so successfully used in G-E station-type and line-type arresters—a combination of *magnetic* action of series gaps to augment the *valve* action of time-proven Thyrite* disks, giving the highest degree of protection ever offered for distribution circuits.

Smaller size and weight of these new arresters—only a fraction of that of comparable arresters—is a further advantage of the new design. They are intended for separate mounting to crossarm or direct-to-pole.

Ratings from 9 kv thru 18 kv are available in a choice of either the external-gap type—or direct-connected type with ground-lead disconnector. Both types give the best in overvoltage protection and both types provide positive protection against line-lockouts. Pellet-type arresters will still be available in voltage ratings 3 kv–15 kv to all users.

For full details of the new line of distribution arresters, check your nearest G-E Apparatus Sales Representative or write to General Electric Company, Schenectady 5, New York. Ask for bulletin GEA-6379. 432-47

*Reg. Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

MEETING REPORT

Next: A Super Push for Farm Wiring?

Success of Farm Wiring Conference prompts NEMA to explore means for all-out campaign. EEI plans "Farm Better Electrically" program

Another high-powered national wiring program—this one gunned specifically at the farmer—may be forthcoming after the interest registered at the first National Farm Wiring Conference in Chicago, May 3-4.

Fred H. Luna, representing National Electrical Manufacturers Association, announced that NEMA was exploring several means for furthering farm wiring promotion:

1. Establish an all-industry plan committee, similar to one now operating in the National Adequate Wiring Bureau;

2. Continue wiring conferences on an annual basis or bi-annually with regional workshops filling in on intervening years.

"Farm Power" Suggested

Going further, Luna, who is chairman of the farm wiring subcommittee of NEMA's Farm and Rural Market Development Committee, suggested a "Farmpower" campaign. In the meantime, he urged all power suppliers to capitalize on the industry's new "Housepower" and "Live Better Electrically" programs.

Edison Electric Institute also may soon add its weight with a farm production campaign with theme, "Farm Better Electrically". J. C. Cahill, Detroit Edison Co, reported that a committee under R. T. Jones, Pennsylvania Power & Light Co, is now formulating promotional plans.

The conference itself was viewed as a stunning success by its NEMA sponsors. More than 250 farm specialists from co-ops and power companies, government, colleges, and national associations attended.

Market Problems Stressed

The fact that farms as well as urban homes are underwired went very much uncontested. It was who these farmers are, how to sell them, and what to sell them that occupied the conference's time.

"The farmer today must learn to think more like a factory manager," said S. J. Rosch, Anaconda Wire & Cable Co. "Farming has become big industry, but too few farmers are aware of this," he declared. "The farm of the future will become not only a food production base, but a source of more and more industrial and medicinal materials."

Aim at Big Ones

Who the farmers are who will buy farm wiring was suggested by W. J. Ridout, Jr, "Electricity on the Farm" magazine. "Too much wiring education with the average bill customer will sell more liquefied petroleum gas equipment than the most elaborate sales program the LP gas dealer can devise," he said. "But for our high use customers or cooperative members the situation is entirely different. The audience for adequate farm wiring promotion in itself should be confined to the top 20% of our farms—or putting it another way, the farms that produce 80% of the total farm product."

Positive means of reaching the farmer, said Detroit Edison's Cahill is through farm magazines and farm organizations. Reporting findings of a farm wiring survey made by utilities in seven states, he said the farmer himself will spread the right—or wrong—information through word-of-mouth contact. Other findings:

- One out of every three farm customers uses LP gas.
- Farmers are not aware of their needs for better wiring. Eight out of ten expressed satisfaction with their present wiring.
- Farmers must be educated to the ultimate savings electricity will bring in labor and elimination of produce spoilage.

"The Farm Wiring Handbook is one of the best available tools for doing this promotion job," said Lowell Endahl, National Rural Electric Cooperative Association. "Utilities should make sure that all farm trade, educational, construction, and government personnel receive copies, and also insurance companies for their use in setting fire insurance rates."

New Spec Book

NEMA's Howard Michener introduced still another promotional tool—a newly revised Farm Wiring Specifications Book soon to be released by the Farm Wiring Subcommittee. The spec book adds the how to the wir-

(*Continued on page* 26)

CENTRAL VERMONT PS'S RALPH BUGBEE HEADS WORKSHOP ON GROUNDING

New demonstrator unit of Anaconda's slotted-stem Soldersealed Pothead shows how these potheads give you a sounder connection now—simplify relocation later.

Ask the Man from Anaconda to demonstrate slotted-stem Soldersealed Potheads to you

When the Man from Anaconda demonstrates how the slotted-stem* Soldersealed Pothead assembles, you will see quickly and clearly for yourself how it:

1 Prevents misalignment of the cable during wiping and filling operation . . . is easiest to install.

2 Produces *permanent*, sure electrical connection.

3 Eliminates possibility of faulty field connection because of *double* action.

4 Is easy to disassemble and reassemble for relocation.

5 Is 100% salvageable—without repairs on the hood.

Every Anaconda Wire & Cable Company district sales office has been supplied with special demonstrator units that fit into a briefcase for showing *in your office*. Ask your Anaconda representative to demonstrate this exclusive Soldersealed Pothead to you the next time he calls.

Anaconda Soldersealed Potheads are available in 1/C type up to 46kv for indoor or outdoor service—stocked, ready for delivery. Now obtain both your power cable and Soldersealed Pothead from Anaconda. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. *Pat. applied for 5639

ASK THE MAN FROM ANACONDA®
FOR SOLDERSEALED POTHEADS

Farm Wiring Push?

(*Continued from page* 24)

ing planning guide supplied in the Farm Wiring Handbook, Michener said. It contains explanatory drawings and model specifications plus a model wiring contract for use by contractors.

Another method of selling—a farm wiring flannel board—was demonstrated by M. L. Whithed who uses it in meetings staged by Atlantic City Electric Co. The company also supplies dealers with pre-printed two-penny postcards which they mark and return each time they sell a piece of electrical equipment.

Plenty of Materials

Apparently the farmer will have little trouble finding the materials needed to carry out his farm rewiring. "There probably has been more developments in the field of farm wiring in the past five years than in any other class of power wiring," declared J. V. McBride, Plastic Wiring & Cable Corp. Among them: Non-metallic box connector of molded nylon, glass reinforced plastic outlet boxes, surface-mounted wiring devices, tougher wiring for submersible pumps.

The conference then broke up into eight workshop groups to mull over the specific farm wiring problems: Here are reports of the chairmen:

• On Grounding and Safety—The subject of grounding still is as controversial as ever. One big unsolved problem is how to detect plastic piping in external water systems used as ground. A possible answer: Measure resistance to ground of water piping in building.

• On Standby Emergency Service—Utilities should recognize the need for standby under certain conditions and help customers install it. For protection every standby generator should be connected to customer's distribution system by a double-throw disconnect switch.

• On Service Entrance Requirements and Diversity Factors—200-amp service will be essential in the near future although many utility men admitted they still were using 160-amp and will for some time.

• On How to Bring Farm Wiring Information to Vocational Agricultural Teachers and Agricultural Workers—Probably less than 50% of these people are well enough informed to give farm families even the most elementary advice on farm wiring. Power suppliers must concentrate more on properly training them and supplying them with the necessary equipment and materials.

• On Methods of Promoting Better Farm Wiring—It must be continuous. Coordinated educational efforts by 4-H clubs, extension workers, vo-ag teachers, contractors, and dealers would be most helpful if they also are backed by local and national publicity. Manufacturers, the report said, should develop an advertising and publicity program beamed directly at the farmer, using the publications he is most likely to read.

• On Adequate Farm Home Wiring—Four principal barriers are seen: **1.** Farmer doesn't recognize the need. **2.** Shortage of skilled electrical contractors to do the job and their lack of understanding of the farmer's needs. **3.** Dealer's ignorance of wiring requirements. **4.** Difficulty in selecting farms which need better wiring and in getting dealers to report sales.

• On the Electrical Contractor's Responsibility—There has been too much negative selling. We must do as the gas people do and sell ranges and water heaters on an installed basis. Other recommendations: Re-inspection should be used as an impetus to rewiring; power suppliers should sponsor farm wiring finance plans; get insurance companies to give credits for improved wiring. Contractor E. B. Oberlander, who chairmanned the group, expressed irritation at the way too much blame is put on the contractor for failure to sell wiring. Don't confuse a qualified contractor with a "jerk with a pair of pliers," he said.

• Problems Encountered in Expanding the Farm Wiring System—We cannot have a national code for farm wiring, declared Charles Wagner, North Central Electric League, who headed this workshop group. "But," he continued, "inspection authorities more and more are interpreting the code to favor us and allow us to take advantage of farms' low demands for high connected loads."

Overhead vs Underground

One topic that drew heavy discussion was "overhead vs underground." To H. H. Watson, chairman of NEMA's Farm and Rural Market Development Committee, the problem actually should be decided by the job itself—in its engineering and economics. "There really isn't any controversy at all," he said.

11.3 Million Units . . .

. . . is NEMA appliance sales forecast for next 12 months; Groups set '57 promotions

Sale of 1.5 million electric ranges, 1.1 million food freezers, and 8.75 million other electrical appliances is what National Electrical Manufacturers Association foresees for the next 12 months.

To capitalize on it, NEMA's major appliance and housewares sections, meeting last month in Hot Springs, Va., laid out new promotional plans. Section members justified their high sales optimism by pointing to such facts as these: 1. Increase in the FHA Title I loan limit from $2,500 to $3,500; 2. Expanding sponsorship of wiring installation and household equipment finance plans by utilities and lending institutions.

Here's what they have in mind for 1957:

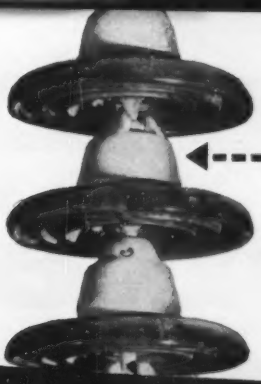
Range Promotions—Heavy concentration on the architect and builder stressing the electric range's growing value as a sales tool. Advertising in construction publications is planned plus an intensified direct mail drive aimed at the custom builder. Simultaneously, a campaign directed at home economics teachers and school officials will offer demonstration recipe booklets and the section's Electric Range Teaching Kit.

Water Heater Promotions—Continued campaign to get plumbers to merchandise as well as install and repair units. For the rural market a new series of booklets has been developed to supplement a sound-slide film already in distribution.

Refrigerator-Freezer Promotions—Still will be pointed primarily at home economics teachers and school officials. Section will offer Freezer Teaching Kit, then survey use made of it with help of 80 utility companies.

Dishwasher Promotions — More than 50 cities will carry out campaigns in coming months using NEMA promotional kits.

Housewares Promotions — Consumer educational program will be continued. Housewares continued to roll up gains in '56 first quarter, making a 10% jump in sales over the same period in record 1955.

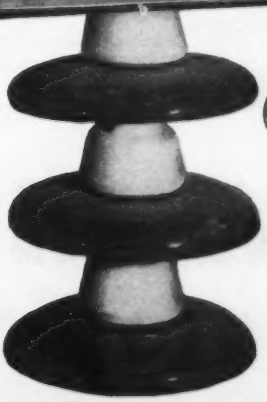


Unretouched photo of insulator string from area with corrosive atmosphere — used in television interference investigation.

DO INSULATORS CAUSE TV INTERFERENCE?

For better understanding of television interference problems, a series of tests was recently carried out in the Locke High Voltage Laboratories. Tests showed that suspension insulators do *not* cause TV disturbances except under extremely light mechanical loading combined with contaminated conditions.

Such investigations are part of our continuing investment in the interest of the Electric Power Industry.



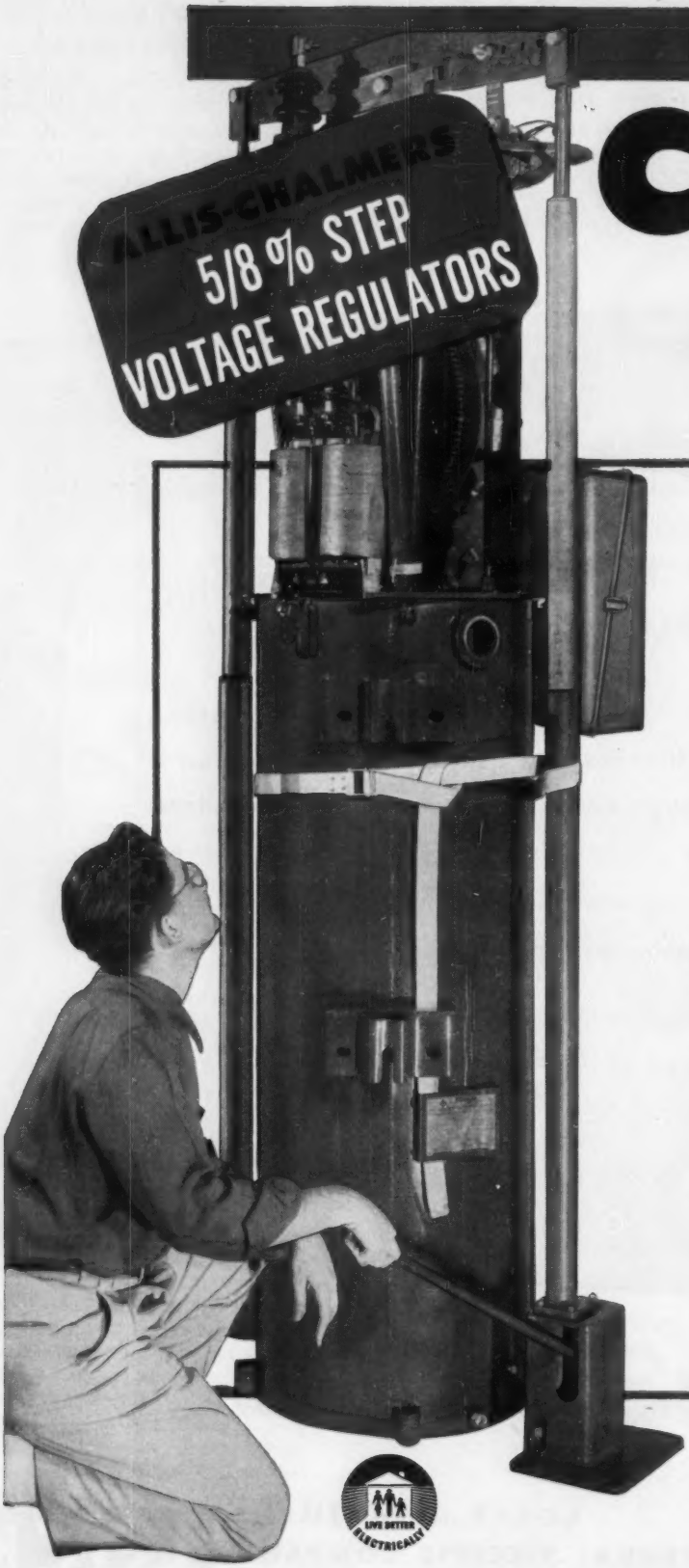
Progress Is Our Most Important Product

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

LOCKE

Compare

Cover Cuts



Here's All You Do to Open Allis-Chalmers Distribution Regulator for Inspection

1. Remove handhole cover and (without tools) disengage position indicator.
2. Remove cover bolts and control cabinet mounting bolts.
3. Attach the hydraulic jack to lifting lugs and hoist for inspection.

ALLIS-

Regulators:

Suspension Inspection Cost 75%

No other regulator offers unit untanking in the field or service shop

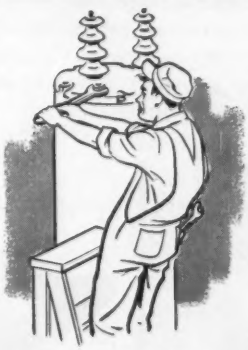
Check Operation...

This is the only regulator that can be checked outside the tank without reassembling parts. Simply apply 120 volts to control. Re-tanking, upon completion of inspection, is simple, too.

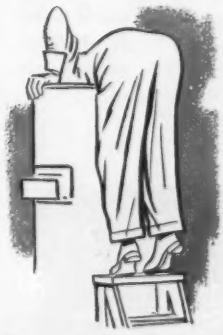
Compare and save! Ask your A-C office for the story on Allis-Chalmers 5/8% step regulators, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Eliminate These Time-Consuming Steps

1 Eliminate oil draining and handling.



2 Eliminate disconnecting and removal of bushings and cover.



3 Eliminate disconnecting of control wires and holddown bolts.

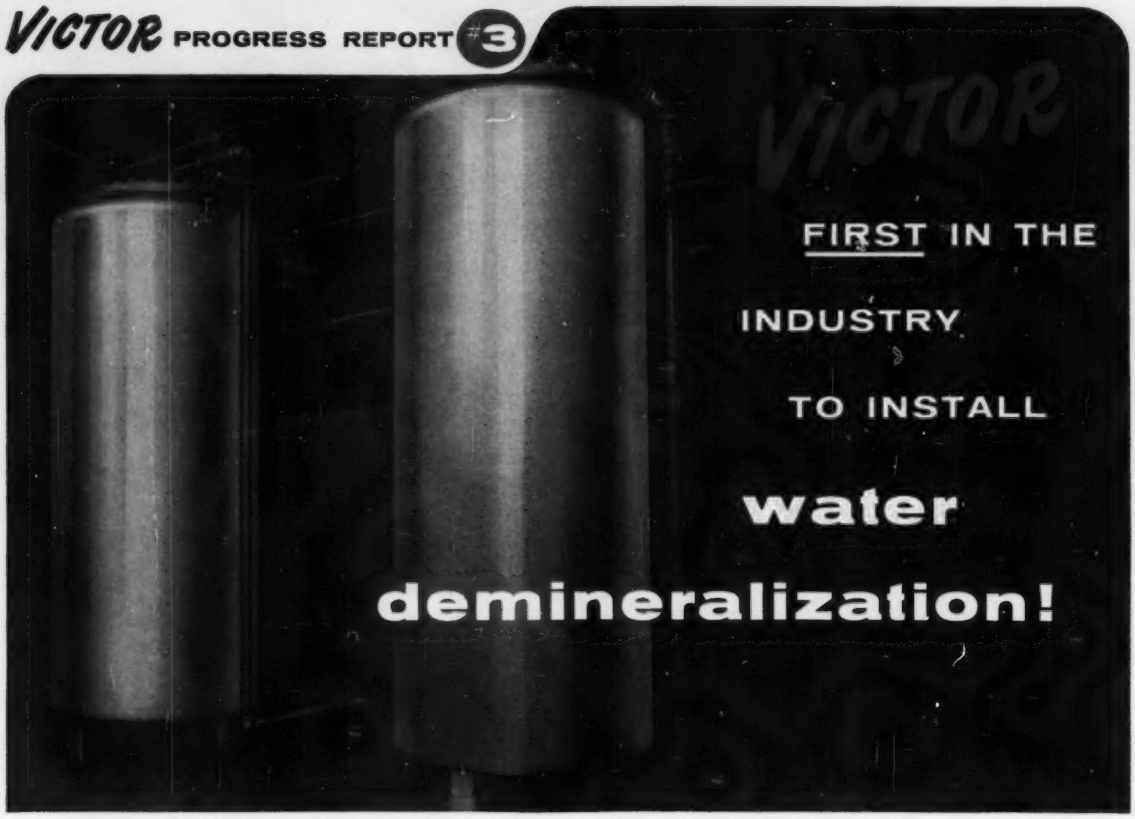
4 Eliminate piecemeal reassembly.

CHALMERS

A-C ALLIS-CHALMERS

A-5103

VICTOR PROGRESS REPORT #3



Victor's extensive ceramic research first brought to light the fact that minerals in processing water cause microscopic agglomerates of glass-like impurities which result in fluctuations in insulator characteristics. As a result, Victor was the *first* porcelain insulator manufacturer to install water demineralization equipment, part of which is shown above. For several years, *all* processing water used in Victor's plant has been demineralized.

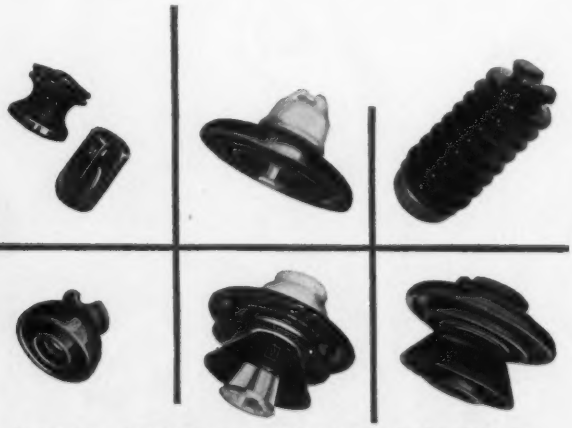
Exhaustive tests have proved that Victor *Purified* Porcelain Insulators, made with demineralized water, have: (1) improved thermal resistance; (2) unmatched porcelain hardness and density; (3) higher average puncture values, and (4) better tension, torsion, cantilever and impact values.

Another example of Victor's ability to give you better insulators through research and modern manufacturing facilities.

SPECIFY
VICTOR
Purified Porcelain Insulators!

I-T-E
VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware



"BETTER INSULATORS THROUGH RESEARCH"

WELCOME is extended to Transmission & Distribution Committee by Harry M. Scheldon, vice president, Pennsylvania P&L

Pennsylvania Electric Association's . . .

T&D Committee Meeting Highlights Role of Research

The importance that electric utilities and manufacturers place on research was evidenced by several papers presented at the spring meeting of Pennsylvania Electric Association's Transmission and Distribution Committee. The group met May 10-11 at Skytop, Pa.

Highlights of the meeting are summarized in the following paragraphs.

• Application guides for use of 69-kv horn-gap, air-break, and load-break switches on magnetizing and network load currents were formulated by W. R. Smith, Pennsylvania Power & Light Co, from a series of tests on new types of switches. As a result, limiting values for safe operation were established as follows:

1. Conventional tilting-insulator type—3 amp, 15 miles for 66-kv charging or magnetizing; 75 amp, 9,000 kva for 66-kv network.

2. Conventional rotating-insulator type—5 amp, 25 miles for 66-kv charging or magnetizing; 100 amp, 12,000 kva for 66-kv network.

3. Quick break arcing horn—10 amp, 50 miles; 100 amp when mounted horizontally upright.

4. Gas blast load break—12 amp, 60 miles; 220 amp, 25,000 kva.

5. Sealed gas chamber load break—12 amp plus, 60 miles plus; 600 amp, 68,000 kva.

• A suggested course of action to be taken in producing long-life compression connectors was outlined by R. L. Lock, vice president and chief engineer, Anderson Electric Corp. His conclusions were based on a recent national survey of key electric utilities having about 60% of the total national generation.

Some of the principal items Lock mentioned were:

1. The maximum number of tools for the entire range of sizes should be limited to five and reduced below that if possible.

2. A combination of hand and hydraulically operated tools "apparently has a chance of being accepted by the utilities." The weight of the latter can be reduced by a separate pump unit in the larger sizes.

3. There is much demand for a lightweight stored-energy tool of very fast operation.

• "The time is ripe for a decision as to whether a fundamental change should be made in distribution systems or present practices should be continued," declared Robert F. Lawrence, manager, distribution engineering, Westinghouse Electric Corp. He discussed higher service and utilization voltages for residential customers as solutions to distribution problems caused by growing loads.

"This is a long-range problem," Lawrence declared, "but we should attack it now." He listed these benefits of a sound solution to residential distribution problems: Utilities would be in a better position to go all out on residential load-building plans; other fuels would get less of a foothold; and distribution costs would be appreciably lower.

Lawrence told the group that he had urged that EEI and NEMA joint committees be formed to attack this

CONGRATULATIONS are given to Paul L. Lumnitzer (left), new chairman of T&D Committee, by Roscoe C. McKee, outgoing chairman of the engineering group

problem. "I am happy to say this is now in process," he added.

This joint committee "should decide on the best voltage and what it considers the best system, and present it to utilities for their consideration as well as to manufacturers whose equipment is involved. Finally, attempts should be made to achieve standardization of an acceptable system, both by utilities and manufacturers."

• The value of standard time studies for overhead line work was discussed by John F. McQuillin, director of general services, West Penn Power Co.

After observing some 25,000 manhours of work, "we had accumulated enough data to begin to establish standard hours" for each element of line work performed by a regular crew.

This study gave West Penn standard times for about 60% of typical line work. In addition to elemental time data, the study also accumulated figures which represented "a percentage of the total day time which should be allowed per crew day for any given job," McQuillin explained.

Principal beneficial uses of such standard time data as an assist to West Penn management are as follows: They provide standard estimating data useful in budgeting money and in making engineering comparisons of one tool or product with another; furnish a basis for measuring crew performance; and can be used in application of "standard cost systems" in distributing labor hours to proper FPC accounts.

• Electric utilities and manufacturers were urged to combine efforts in developing the vacuum switch from its present radio use into effective utility applications. Joseph W. Rittenhouse, technical director, Hi-Voltage Equipment Co, warned that this transition should not be made too hastily.

He cautioned that laboratory tests on laboratory-constructed switches should not be taken as assurance that production-line switches will duplicate their performance.

The high rate of rise of dielectric strength makes the vacuum switch ideal for capacitor switching with possible economical applications up to 5,000 kvar, 33 kv, he said.

Paul L. Lumnitzer, vice chairman of the T&D Committee, was named chairman to succeed Roscoe C. McKee. McKee is with West Penn Power and Lumnitzer with Pennsylvania Electric. The new vice chairman is C. E. Hartay, Duquesne Light Co.

Relay Engineers Conference Studies Current Problems

Current problems of relay application and operating were covered at the 1956 Conference for Protective Relay Engineers held at Illinois Institute of Chicago on April 26 and 27.

The effect of transformer impedance, connections, and taps upon setting of low side impedance relays protecting both the line and associated transformer bank was explained by John Hagbert, Westinghouse Electric Corp. There are definite economies possible compared with installations resulting in more complicated applications, he said.

Typical current differential bus protection depends considerably upon current transformer performance and must be made inoperative during switching operations, O. A. Lentz and H. P. Dupuis of Commonwealth Associates told the conference. These difficulties are avoided, they said, with a bus blocking system for a sectionalized bus.

The transient performance of current transformers and its effect upon relays were outlined by A. J. McConnell, senior engineer, General Electric Co. Special design precautions for modern differential on balanced type relays avoid misoperation on transient C T errors. Slower operation may result from or be required as a corrective measure respectively for ground and impedance relays.

E. J. Field, R&IE division of I-T-E Circuit Breaker Co, forecast further development and acceptance of automatic circuit reclosers because of the low cost and one cycle clearing advantage relative to oil circuit breakers with relays on low voltage distribution circuits.

A review of economies of capacitor potential devices for relays and instruments was offered by D. B. Brandt, General Electric. Careful adjustment with consideration of the burden characteristics and requirements enables operation approaching that expected with potential transformers, he said.

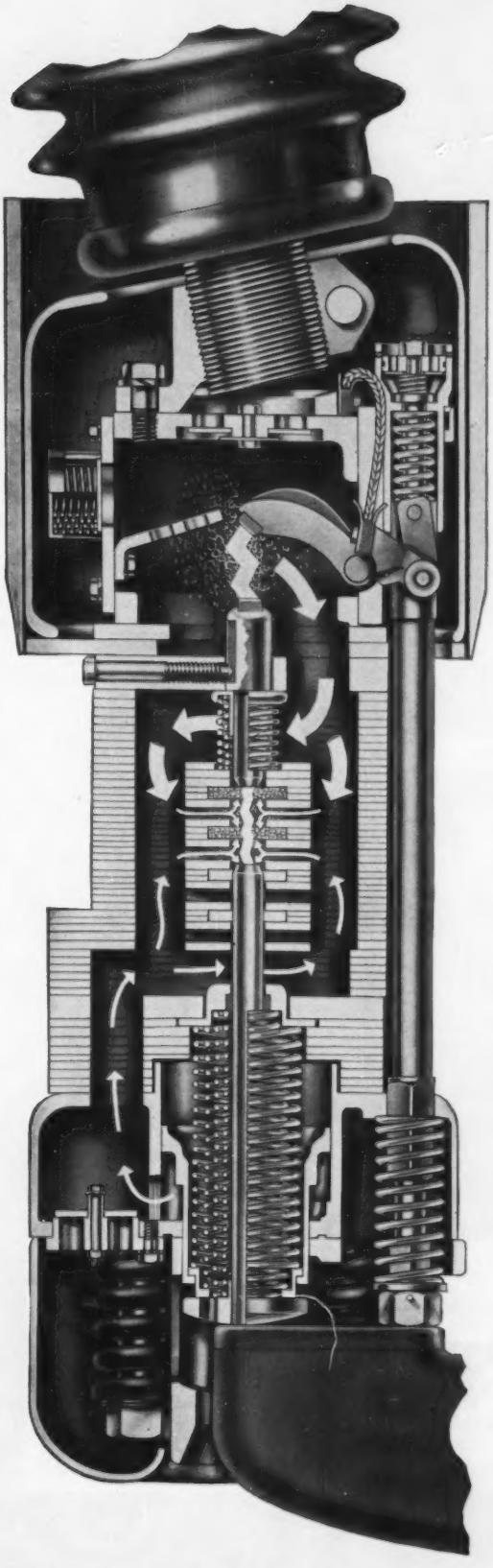
George Hampe, relay settings engineer, Commonwealth Edison Co, described an improved logging system for classifying major power system troubles, which makes it possible to evaluate certain protective systems. It also provides quick data for executive information.

According to G. D. Rockefeller, Westinghouse, pilot wire relaying can be made more reliable by the use of fault detectors and channel failure blocking. Economy is possible with pilot relaying that is not possible with other more complicated schemes. Satisfactory remote trip depends upon the reliability of the trip signal transmission.

Leonard G. Walker, Motorola, Inc, described high-speed frequency shift audio tone equipment cable of continuous channel and signal supervision as one of the best means for providing transfer trip relay protection which requires high reliability and security with minimum practical transmission delay. The reliability provided by microwave offers the most appropriate communication medium available to the utility relaying engineer and one which associated with high quality data multiplexing equipment is capable of adequately handling transfer trip protective relaying data transmission.

Power Election Issue

Power promises to be a big issue in Washington State next fall, said Gov Arthur B. Langlie recently in announcing his candidacy for the U. S. Senate on the Republican ticket. Langlie, a strong opponent of a federal high dam on the Snake River at Hell's Canyon, and a proponent of Idaho Power Co's construction of low dams on the site, is predicted to run against incumbent Sen Warren G. Magnuson, a strong public power advocate. Langlie's opposition to Tacoma's construction of two power dams on the Cowlitz is also considered a factor.



No other interrupter offers all this

Greater system stability . . . duration of faults is sharply limited, thus keeping them from lowering effective machine voltages and reducing synchronizing power. The result is better service continuity.

Shorter arcing time . . . plenty of fresh oil is brought across the entire arcing path, cooling the arc and removing ionized gases. Insulation is increased so that the arc cannot re-establish itself after current zero.

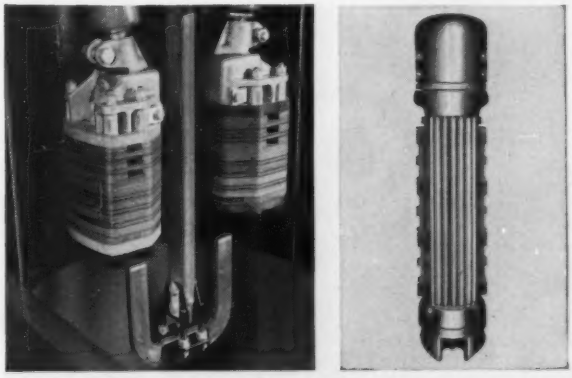
Reduced arc energy . . . arcing time and arc length are reduced. An arc so restricted has low arc voltage, low energy.

Lower maintenance . . . low arc energy during interruption limits oil carbonization and lengthens contact life. The entire grid is designed for easy, simplified inspection of contacts and parts without dismantling.

Longer oil life . . . carbonization is reduced, interruption quicker. "De-ion®" grid breakers maintain necessary insulating level through more interruptions than other types.

High-power laboratory tested . . . complete verification of all interrupting ratings.

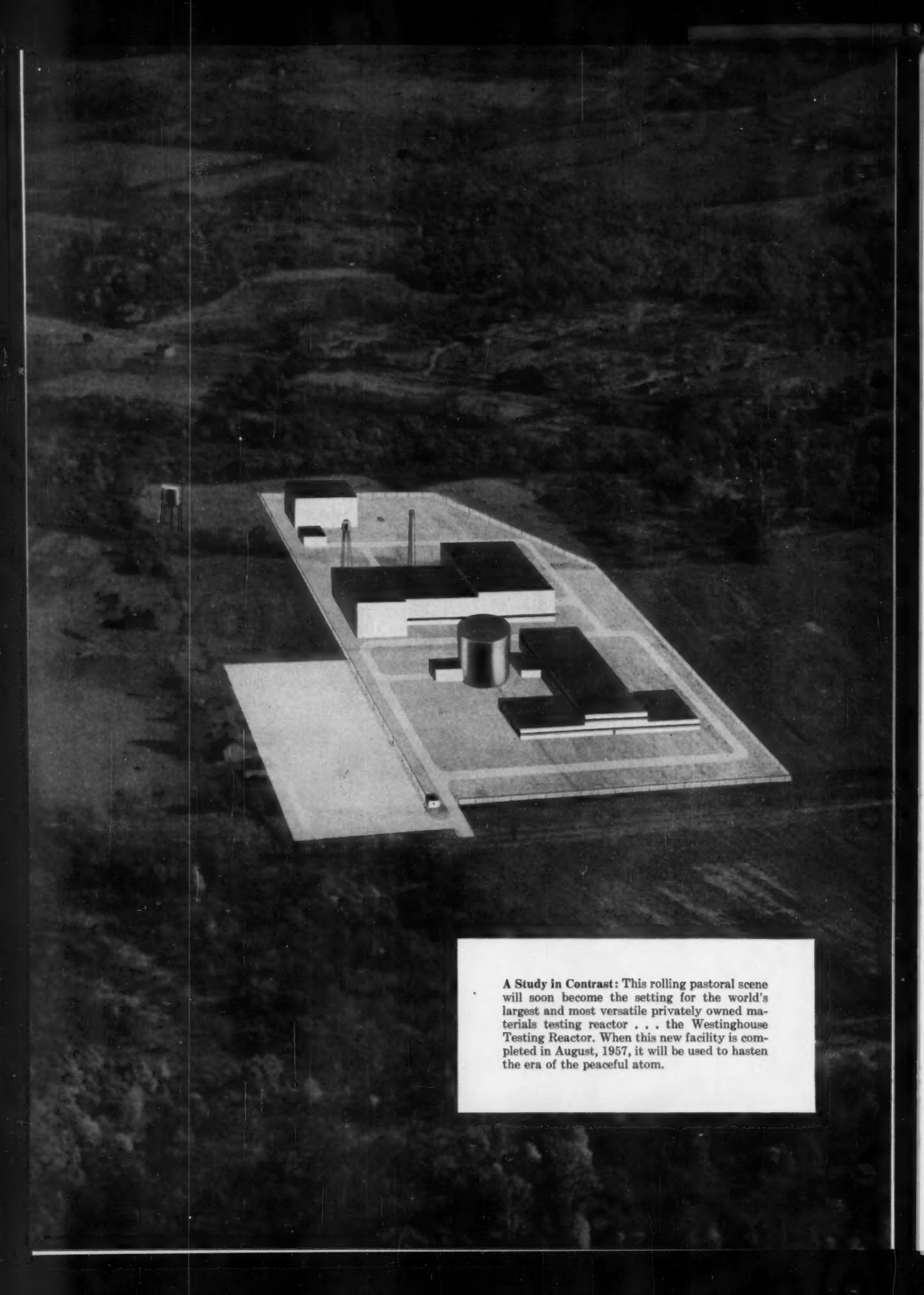
Here is reliability that means freedom from the inconvenience and worry about faulty operation. De-ion grids have proved, through years of trouble-free service, that they can be depended upon to do their job quickly and efficiently. J-60889



Above is a cutaway view of the Multiflow grid showing the path of the oil in quenching the arc. The Multiflow grid is used on breakers rated 69 kv and above. At the right are the Magnetic and Tubular grids used in breakers rated 69 kv and below, and high capacity 138 kv and above, respectively. These grids have proved, in service, that they have no equals in efficiency and reliability.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***



A Study in Contrast: This rolling pastoral scene will soon become the setting for the world's largest and most versatile privately owned materials testing reactor . . . the Westinghouse Testing Reactor. When this new facility is completed in August, 1957, it will be used to hasten the era of the peaceful atom.

Meeting the Nation's Growing Power Load

This is WTR

Westinghouse Testing Reactor

Industry's first nuclear materials testing facility

WTR will never put a kilowatt on the line—itself. But through its contribution to nuclear technology, electric utilities will generate millions of kws in commercially practical atomic power plants sooner.

WTR represents a greatly expanded facility for experimentation. It will enable testing of fuel elements, and such testing is vital to the economics of commercial atomic power. The information gained will be directly associated with the ratio of fuel cost to kilowatt output.

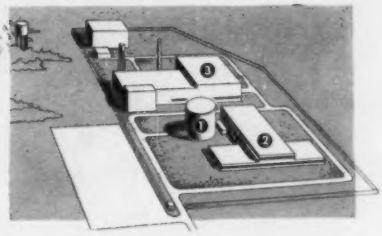
Only under the actual conditions of irradiation, heat and pressure can materials for reactor use be effectively evaluated. WTR offers the hard flux, the wide range of temperatures and pressures and the capacity required. It is one of the most significant steps in the "Atoms for Peace" program.

WTR will be completed in August, 1957, and by November 1, 1957, its facilities will be available to industry. This $6½ million installation is another tool by which Westinghouse develops better apparatus to help the electric utility keep a step ahead of the nation's growing appetite for electric power.

J-57004

WATCH WESTINGHOUSE!

FIRST IN ATOMIC POWER



WTR's Layout will follow the outline above. The reactor is housed in building (1), a cylindrical vapor container. To the right is the reactor service building (2), connected to the reactor building by a personnel passageway and canal. The service building will contain the control room for the reactor, the "hot" cells and laboratories, offices and health physics installations. Directly behind the reactor building is the process building (3), which will contain the primary loop equipment, such as pumps and main heat exchanger, waste disposal plant, ventilation equipment, plant service equipment and a shop area for fabricating experimental parts and assembling loops used with the reactor.

The Reactor will operate initially in the heat range of 20 megawatts, with a total fuel loading of 10 to 12 kilograms. The design will permit a substantial increase in power. Fuel assemblies are completely symmetrical and may be turned upside down in the core mounting tubes to obtain maximum burn up. A total of 5,200 linear inches of various diameter space plus an 8-inch diameter beam hole will be available for irradiation experiments. Flux densities as high as 8×10^{13} will be available. Several high-pressure thimbles for experimental or prototype fuel element testing at simulated conditions of actual power reactor operation may be inserted in the core.

The Location of WTR, 30 miles southeast of Pittsburgh, makes it immediately available to other facets of the Westinghouse atomic energy research and manufacturing facility. That facility, the most experienced in the industry, includes:

Commercial Atomic Power Activities, East Pittsburgh, Pa. Responsible for design and sale of commercial nuclear power plants.

Atomic Fuels Department, Cheswick, Pa. Manufacturer of fuel elements and core assemblies.

Atomic Equipment Department, Cheswick, Pa. Manufacturer of specialized components for nuclear power systems, canned motor pumps, coolant loop valves and nuclear instrumentation.

Materials Engineering Department, Blairsville, Pa. Producer of uranium and thorium fuel alloys and high-purity reactor fabrication materials.

The Bettis Plant, Pittsburgh, Pa. Research and development facility operated by Westinghouse for the AEC.

And, Westinghouse Research Laboratories, East Pittsburgh, Pa. Where science produces a foundation for better processes and better products.

NEWS ABOUT PEOPLE

H. J. Scholz is Appointed President of SEG

H. J. Scholz, president of Southern Services, Inc, has been appointed president of the recently proposed Southern Electric Generating Co. The new company, now being organized by the Southern Co, will be jointly owned by Alabama Power Co and Georgia Power Co.

Scholz, as SEG president, also retains his present position of Southern Services head, a post he has held since 1949. He started out in the utility field in 1922 when he joined the engineering staff of Alabama Power Co. Nine years later he became associated with Commonwealth & Southern Corp Service Co, where he served as supervising engineer. Scholz was named vice president of C&S in 1947. Two years later, when C&S dissolved to form two service companies, Scholz became president of one of these.

Other officers of Southern Electric Generating are J. F. Crist of the Southern Co, who will be executive vice president; and Walter Bouldin of Alabama Power and J. J. McDonough of Georgia Power, who will become vice presidents.

H. J. SCHOLZ

Alabama Power Co Ups Harris

Alabama Power Co has announced the promotion of R. L. Harris from manager of electric operations to vice president of the company.

Harris, a graduate of the University of Alabama, has been with the utility since 1923. Two years later he was named results engineer at the Gorgas plant. From there he advanced to results engineer and assistant to the Magazine plant superintendent, office engineer, and mechanical engineer and inspector at the Chickasaw plant. Harris was promoted to assistant superintendent of production in 1941, superintendent of production the next year, and manager of production in 1951. He was named to his most recent post of electric operations manager in 1954.

R. L. HARRIS

FP&L Promotes Fuqua to VP

Newly elected as a vice president of Florida Power & Light Co is Ben A. Fuqua, who previously held the post of executive assistant to the president and general manager of the utility.

Before joining Florida P&L in 1949 as an administrative assistant to the vice president, Fuqua was legislative secretary and executive assistant to Gov Millard F. Caldwell. A graduate of the University of Florida, Fuqua became financial secretary to the Manatee County Commission in 1933, and in 1937 was named a member of the Florida legislature from the same county. He served as chief clerk of that body in 1939 and 1941.

BEN A. FUQUA

Weather-protected by this exclusive design

KEARNEY TRIPOMATIC ENCLOSED CUTOUTS

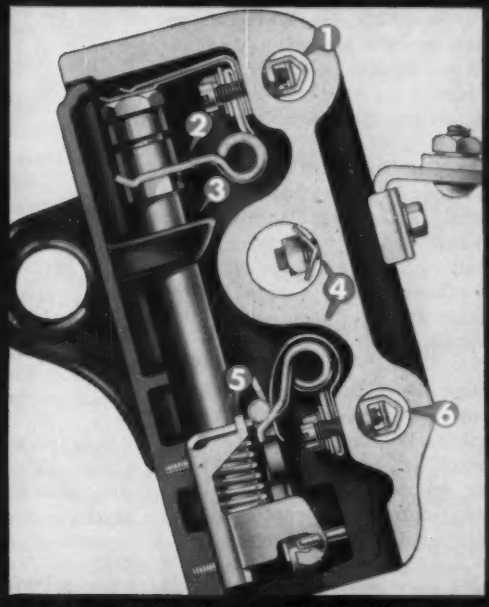
The exclusive design of the wet process porcelain housing of the KEARNEY Tripomatic provides greatest possible weather protection. The lead-in holes for the back connected terminals are isolated from the cartridge chamber by a porcelain wall. This feature eliminates the source of most dirt deposits inside the box, and keeps out rain and snow.

Contacts and hanger bracket are not "cemented on" but *bolted through* the porcelain wall . . . so they can never pull out of the housing.

design features...

Continuous research, development and testing brought these important features out of the laboratory. Consistent manufacture keeps Tripomatic quality at the highest level.

1. Stirrup type terminals are fully plated. 50 ampere cutouts take No. 2 str.; 100 ampere ratings take No. 1/0 str.
2. Resilient spring contacts absorb tube thrust when fuse link blows. Maintain high pressure contact after long service.
3. High gas barrier and matching tube guide prevent short circuits between contacts. Gives extra leakage distance.
4. Hanger bracket, contacts and terminals are attached to the housing by through bolts. They can never pull out.
5. Spring backed toggle mechanism assures positive dropout.
6. Lead-in holes are external to cartridge chamber, to keep dirt and moisture out of the inside of the housing.



JAMES R. KEARNEY CORP. 4224-42 Clayton Avenue • St. Louis 10, Mo., *Canadian Plant:* Guelph, Ontario

320

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

KEARNEY PRODUCTS

The Mark of Quality

Consumers Power Co Advances Boris

The board of directors of Consumers Power Co has announced the election of Walter R. Boris as secretary of the company. Boris succeeds Archie J. Mayotte, who retired May 31 after 39 years with Consumers Power, the last 19 years of which he served as secretary.

Boris is a graduate of the University of Michigan with degrees in both engineering and law, and has been associated with Consumers Power since 1950. He is a member of the bar in Michigan and New York.

WALTER R. BORIS

PERSONAL BRIEFS

Dean O. Steadman, formerly manager of public relations for Canadian General Electric Co, Ltd, has been appointed manager of the Canadian Adequate Wiring Bureau.

Bernard E. Gallagher and **Gerald R. Hadden** have been elected assistant vice presidents of Consolidated Edison Co of New York, Inc. Gallagher previously served as assistant to the president and Hadden is former assistant manager of the company's station construction and shops department.

South Carolina Electric & Gas Co has named **R. Hunter Kennedy** to the newly created post of director of atomic development. Kennedy is former deputy director of the Engineering and Construction Division of the Atomic Energy Commission at the Savannah River Plant.

George D. Gibson and **T. Justin Moore, Jr,** members of the firm of Hunton, Williams, Gay, Moore & Powell, have been appointed as associate general counsel and assistant general counsel, respectively, of Virginia Electric & Power Co.

Newly elected first vice president of Public Utilities Advertising Association is **R. D. Furber,** director of the public information and advertising department of Northern States Power Co . . . **Frank Gleeson,** NSP's director of personnel, was recent management recipient of the First Annual Labor Relations Award presented by the Minneapolis Junior Chamber of Commerce. He was awarded "for an outstanding job in promoting good labor relations in the community."

New executive vice president and general manager of the Remington Rand Division of Sperry Rand Corp is **Marcell Rand,** who has been vice president and general manager of the Remington Rand International Division for the past seven years.

Walter K. Freeman has been transferred from the engineering department of Simplex Wire & Cable Co to the post of product development engineer.

Morris Brenner has been named chief engineer in charge of all engineering activities for Penn-Union Electric Corp. He was previously with Burndy Engineering Co.

Filling the newly created post of Square D Co export manager is **Sager T. Colman,** who formerly held management positions in the company's main Detroit plant and in the New York area field organization.

Recent promotions in Elliott Co's Crocker-Wheeler Motor Division include advancement of **Philip Scarola** to sales manager, and **Charles R. Steen** to manager of engineering.

Chris J. Witting, vice president of Westinghouse Electric Corp, was recently elected to the board of governors of National Electrical Manufacturers Association . . . Westinghouse has named **William C. Meyer** to succeed **C. W. Wellington, Jr,** as purchasing agent, East Pittsburgh Divisions. Wellington becomes director of purchases for the company's apparatus group. Replacing Meyer as purchasing agent for the Standard Control Division is **John P. O'Leary.**

Executive changes at International Harvester Co include: **John L. McCaffrey,** from president to chairman of the board and chief executive officer; **Peter V. Moulder,** from executive vice president to president; **Frank W. Jenks,** from vice president in charge of merchandising to executive vice president; and **Harry O. Bercher,** from vice president in charge of the steel division and purchasing and traffic to executive vice president.

Martin J. O'Brien, Jr, has been named manager-manufacturing engineering for General Electric Co's foundries in Everett and Lynn, Mass. . . . New manager-builder sales for GE's home heating and cooling department is **Lee D. Nutter.**

Southern States Equipment Corp has announced the appointment of **E. W. Lindsay** as chief of its research and development section.

Fred Ullberg, Jr, has been elected vice president of sales for T. J. Cope, Inc, to replace **James G. Thomas** as General sales manager. Post of chief engineer, formerly held by Ullberg, will be assumed by **Emil Marcmann,** who also retains his title of works manager. The new appointments are also effective for the Instrof Division, wholly owned subsidiary.

OBITUARY

Walker G. White, 60, general manager of contracting operations for the Elevator Division of Westinghouse Electric Corp, died recently in New York.

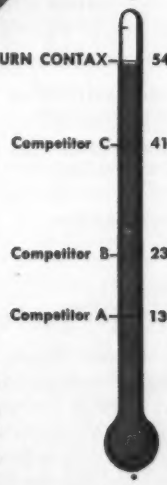
BLACKBURN

contax

IN NEW CRACK-PROOF CONTAINER

No messy, leaky tubes
. . . no wasted paste

Blackburn Contax's new, no-leak plastic container will save time and tempers on the job . . . besides saving money in wasted material due to "throw-away" losses from cracked tubes. Contax is a mineral base grease with non-gassing zinc dust held in suspension. Zinc particles penetrate the oxide film, improving connection electrically—compound seals out air and moisture and protects against galvanic corrosion.



NO DRIPPING UP TO 549° F.

The thermometer chart at right demonstrates the superior heat resisting qualities of *CONTAX* over competitive compounds.

Available at electrical wholesalers everywhere

JASPER BLACKBURN CORPORATION

35 MADISON STREET • ST. LOUIS • MAIN 1-2821

MEETINGS CALENDAR

JUNE

EDISON ELECTRIC INSTITUTE—24th Annual Convention, Traymore Hotel, Atlantic City, June 4-6.

NATIONAL FIRE PROTECTION ASSOCIATION—60th Annual Meeting, Statler Hotel, Boston, Mass., June 4-8.

NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS—48th Annual Convention, Ambassador & Chelsea and Ritz Hotels, Atlantic City, N. J., June 11-14.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Semi-Annual Meeting, Statler Hotel, Cleveland, Ohio, June 17-21.

AMERICAN SOCIETY OF TESTING MATERIALS—59th Annual Meeting & 12th Apparatus Exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J., June 17-22.

FIFTH WORLD POWER CONFERENCE—Vienna, Austria, June 17-23.

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS—Semi-Annual Meeting, Washington, D. C., June 18-20.

CANADIAN ELECTRICAL ASSOCIATION—Annual Convention, Manoir Richelieu, Murray Bay, Quebec, June 18-20.

ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION—Summer Meeting, La Playa Hotel, Carmel, Calif., June 20-23.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Accounting & Business Practice Section, Multnomah Hotel, Portland, Oregon, June 21-23.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—Accident Prevention Committee Conference, Hotel Roanoke, Roanoke, Va., June 22.

WISCONSIN UTILITIES ASSOCIATION—Accounting Section Convention, Schwartz Hotel, Elkhart Lake, Wis., June 24-26.

MICHIGAN ELECTRIC ASSOCIATION—Annual Convention, Grand Hotel, Mackinac Island, Mich., June 24-27.

ATOMIC INDUSTRIAL FORUM, INC—Conference sponsored jointly with Denver Research Institute, Denver, Colo., June 25-26.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Summer and Pacific General Meetings, Fairmount Hotel, San Francisco, California, June 25-29.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—Annual Meeting, Iowa State College, Ames, Iowa, June 25-29.

***INTERNATIONAL ELECTROCHEMICAL COMMISSION**—Deutches Museum, Munich, Germany, June 26-July 6.

AMERICAN CHIEF ENGINEERS' ASSOCIATION—Northwest Power Show, Minneapolis Auditorium, Minneapolis, Minn., June 28-July 1.

JULY

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, General Oglethorpe Hotel, Savannah, Ga., July 12-13.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION—Council Meeting, Geneva, Switzerland, July 16-21.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—Annual Convention, Sheraton Palace Hotel, San Francisco, Calif., July 24-27.

COLUMBIA UNIVERSITY INDUSTRIAL & MANAGEMENT ENGINEERING DEPARTMENT—Fifth Annual Utility Management Workshop, Arden House, Harriman, New York, July 29-Aug. 10.

AUGUST

WESTERN ELECTRONIC SHOW AND CONVENTION—Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, Calif., Aug. 21-24.

SEPTEMBER

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Accounting Section, Cascadian Hotel, Wenatchee, Wash., Sept. 11-14.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—3rd Annual Electrical Conference of the Petroleum Industry, Kansas City, Mo., Sept. 12-14.

EDISON ELECTRIC INSTITUTE—Organization Meeting, sponsored jointly with AGA, Edgewater Beach Hotel, Chicago, Ill., Sept. 13-14; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 17-19; Meter & Service Committee, Purdue University, Lafayette, Ind., Sept. 24-26.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 14-15.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Hotel Statler, Boston, Mass., Sept. 17-21.

INSTRUMENT SOCIETY OF AMERICA—11th Annual Instrument-Automation Conference and Exhibit, New York Coliseum, Sept. 17-21.

ATOMIC INDUSTRIAL FORUM, INC—3rd Annual Forum Conference and 2nd Annual Trade Fair, Morrison Hotel and Navy Pier, Chicago, Ill., Sept. 24-28.

PENNSYLVANIA ELECTRIC ASSOCIATION—Annual Meeting, Hotel Wm. Penn, Pittsburgh, Pa., Sept. 25-26.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Blackstone Hotel, Chicago, Ill., Sept. 26; Workshop Conference, Blackstone Hotel, Chicago, Ill., Sept. 26-28.

OCTOBER

EDISON ELECTRIC INSTITUTE—Prime Movers Committee, Hotel Radisson, Minneapolis, Minn., Oct. 1-3; Electrical Equipment Committee, Hotel Statler, Cleveland, Ohio, Oct. 15-16; Transmission and Distribution Committee, Hotel Statler, Buffalo, N. Y., Oct. 18-19.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5.

INDIANA ELECTRICAL ASSOCIATION—Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 3-5.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 7-10.

INTERSTATE POWER CLUB—Hotel Martinique, New York, Oct. 8.

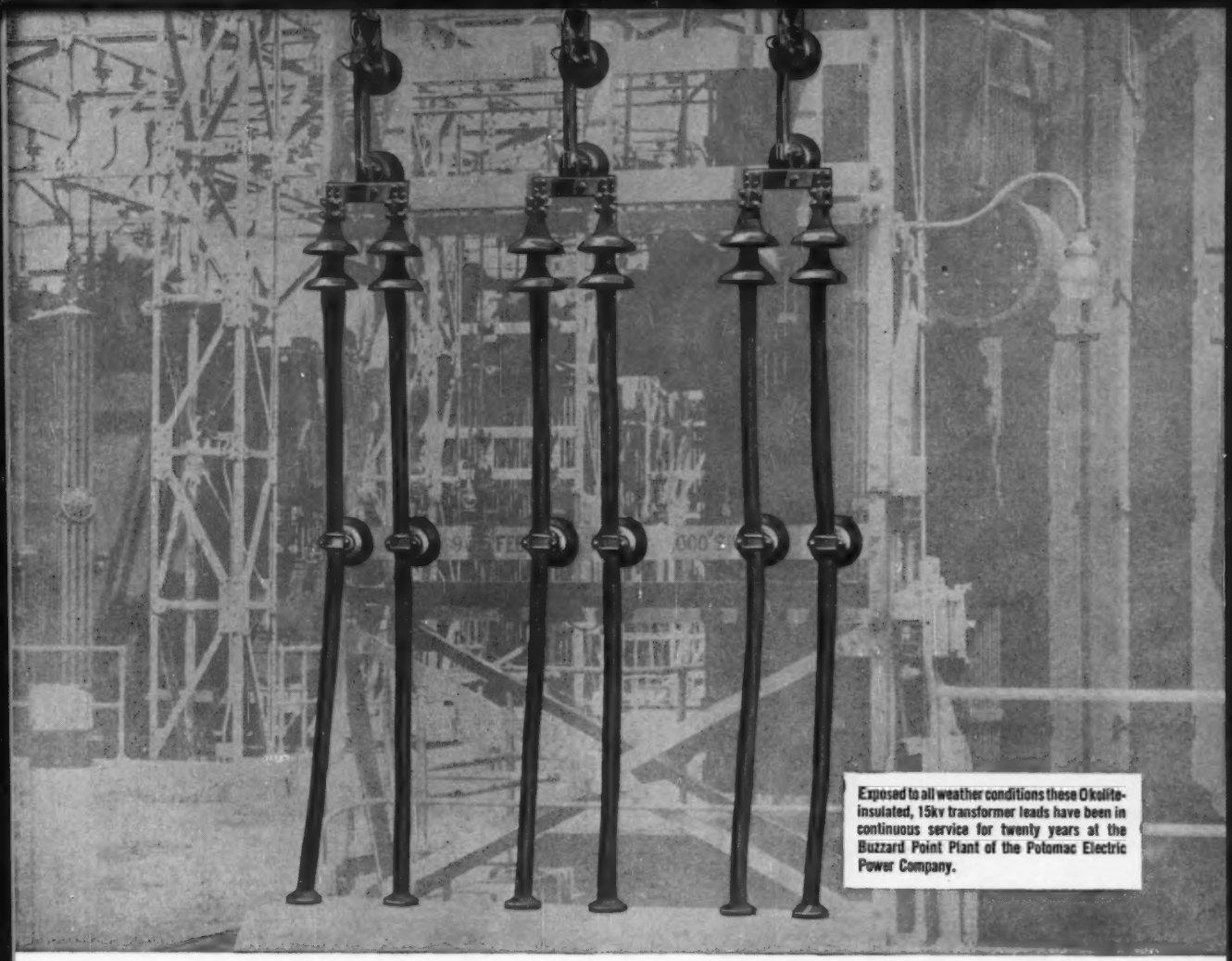
ILLINOIS INSTITUTE OF TECHNOLOGY—Conference on Computer Applications, Chicago, Ill., Oct. 9-10.

AMERICAN STANDARDS ASSOCIATION—38th Annual Meeting and 7th National Conference on Standards, Hotel Roosevelt, New York, Oct. 22-24.

* Additions this week

Atom-for-Peace Books Available

Four more volumes of the Geneva Atoms-for-Peace Conference, English-language editions, are now available from Sales & Circulation Section, United Nations, New York, or through UN sales agents. They are Cross Sections Important to Reactor Design (Vol IV, $7.50); Nuclear Chemistry and the Effects of Irradiation (Vol VII, $10); Applications of Radioactive Isotopes and Fission Products in Research and Industry (Vol XV, $7.50); and Record of the Conference (Vol XVI, $5). The full set of 16 volumes will be priced at $130.

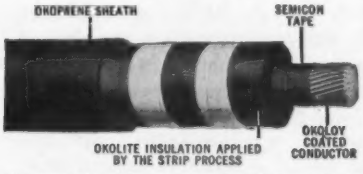


Exposed to all weather conditions these Okolite-insulated, 15kv transformer leads have been in continuous service for twenty years at the Buzzard Point Plant of the Potomac Electric Power Company.

the important cable question: *will it last?*

"Will the cable last?" With installation, maintenance and replacement costs at an all time high, cable users are making this their principal buying guide.

Okonite answers this question with



Okolite-Okoprene—a cable with a thoroughly established service record for long life. Okolite, the only oil-base rubber insulation made with natural wild Up-River Fine Para rubber, is compounded with an exclusive oil-base formula developed by Okonite in 1924. It is recommended for general use up to 35,000 volts.

Okoprene, a neoprene-base compound, is bonded to the Okolite insulation through vulcanization in a metal mold. Introduced to the trade by Okonite in 1935, this non-metallic protective covering provides a tough, service-proved, weather resistant sheath.

Hundreds of case histories provide positive proof of the long life and dependability of Okonite cables. One such installation is pictured above.

Next time you buy a rubber-insulated cable, be *sure* it's going to last.

To be sure: specify **Okolite** for

1. High resistance to corona cutting (ozone), moisture and heat.
2. High current carrying capacity and dielectric strength.
3. Low specific inductive capacity and power factor.

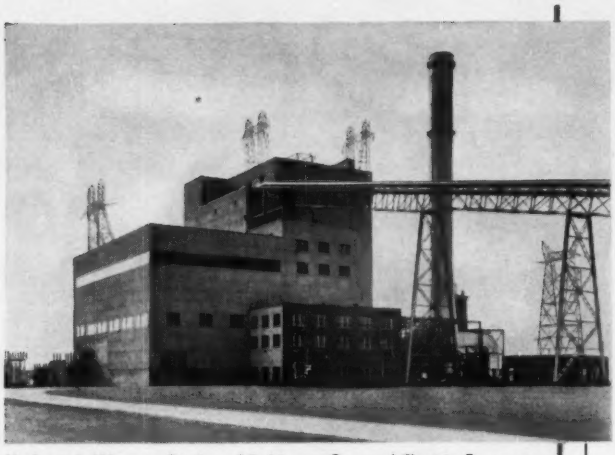
To be sure: specify **Okoprene** for

1. Additional insulating strength.
2. High resistance to heat, weather, abrasion, corrosion.
3. High surface resistivity and ozone resistance.

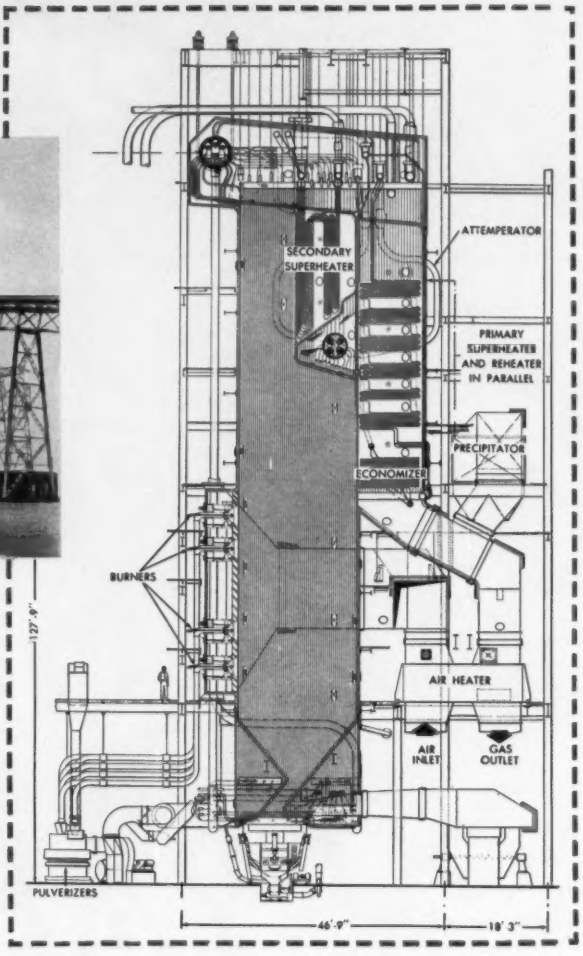
THE OKONITE COMPANY • PASSAIC, N. J.

Available with either copper or aluminum conductors

OKONITE OKONITE SINCE 1878 ***insulated cables*** 2890



Herbert A. Wagner Station of Baltimore Gas and Electric Company.



Modern Central Stations
Serving America

Baltimore Gas and Electric's

HERBERT A. WAGNER STATION

Equipped with Another B&W Radiant Boiler

Baltimore Gas and Electric Company, moving forward to meet the growing industrial, commercial and residential energy requirements of Greater Baltimore, now has more than 955,000 kw installed capacity.

B&W Boilers have long given dependable service to Baltimore Gas and Electric, and when the utility was choosing equipment for the Herbert A. Wagner Station, its engineers selected a B&W Radiant Boiler with reheat. The unit delivers 950,000 lb of steam per hr. Design pressure is 2075 psi, with superheater outlet pressure of 1875 psi and temperatures at 1000 F. Reheat temperature is 1000 F.

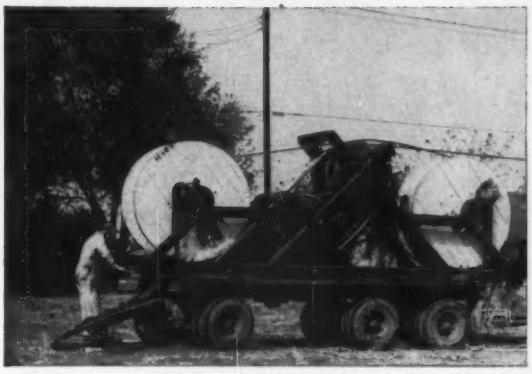
B&W Boilers such as that installed in Herbert A. Wagner Station are the product of almost a century of boiler making experience, combined with the practical advances gained through B&W's continuing program of research and development—a combination that is making basic contributions toward increasingly efficient steam-electric power generation. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

G-759

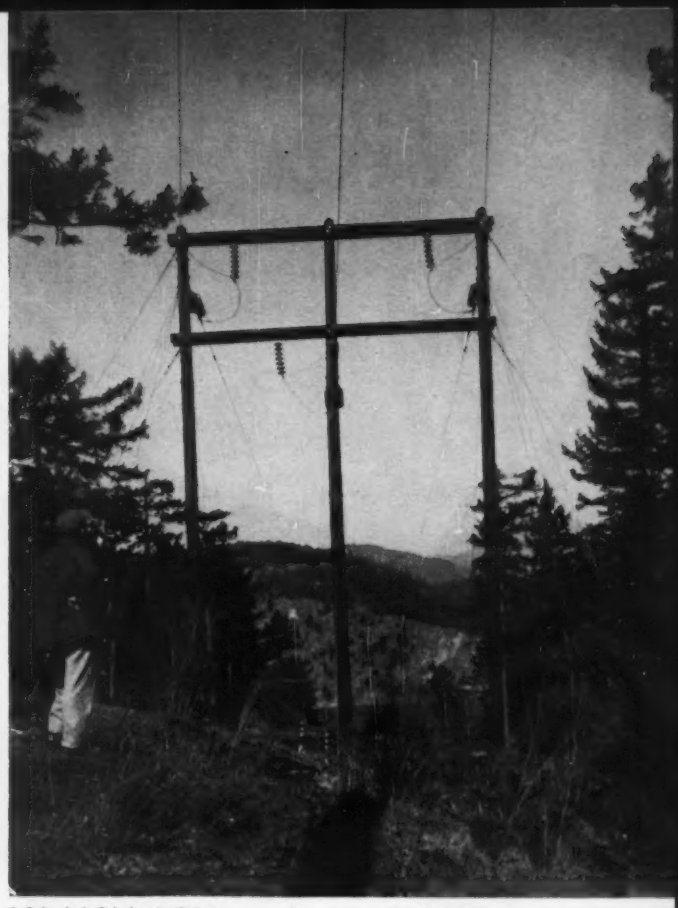
BABCOCK & WILCOX

BOILER DIVISION

Lead-in line by helicopter . . .



And tension stringing of . . .



203-MCM ACSR conductors help to . . .

Carry Line over Water and Thru Park

MALCOLM CROPLEY and LELAND PETITJEAN, Engineering Dept, Puget Sound Power & Light Co, Seattle, Wash.

Combination of a helicopter and a tension wire stringer was the answer to the stringing of 203-MCM ACSR conductors across two wide stretches of water and through a state park by Puget Sound Power & Light Co. The helicopter pulled in a lead line over Deception Pass, a 2,000-ft channel of extremely fast tidal currents and short ebb tide, and for a 2,250-ft crossing above Cornet Bay, both on Puget Sound. Tension stringing held necessary right-of-way clearing to a minimum on heavily timbered slopes in Goose Rock State Park and obviated the need for a boat during stringing.

Local conditions made the design and construction features of the two crossings unusual. The line crosses Deception Pass, then contacts a scenic promotory of the state park, and continues across Cornet Bay which presents an elevation difference of 350 ft between high and low terminals. The Deception Pass crossing is 3,173 ft and the Cornet Bay crossing, 2,250 ft.

Three-pole crossing structures consist of western red cedar poles, but creosoted and painted above with penta chlorophenol. Deception Pass and north Cornet Bay structures are set in and anchored to solid rock. Pole lengths range from 50 to 65 ft. Main guys are ½-in EHS Copperweld strand to 1-in. galvanized rods and expanding rock anchors which were grouted in. South Cornet Bay structure is earth set, with guy anchors consisting of 12 in. x 9 ft creosoted logs with channel-iron backing.

A ½-in. manila rope was carried by helicopter from north to south across Deception Pass and over the trees. Then a 7/16-in. wire running line was pulled in to string the 203,-200-cir mils, 16/19, ACSR conductors. Stringing tensions of 5-6,000 lb were maintained with the tension wire stringer. Conductors were sagged to an initial tension of 6,738 lb at 60F. Maximum design tension is about 11,-600 lb under NESC medium loading conditions.

Cornet Bay was strung in a similar manner, except that the helicopter carried a ¼ in. steel line. This span also was sagged to a somewhat lower tension as the tree clearance problem was not present.

On the Deception Pass crossing, a commitment on tree conservation limited conductor spacing to 15 ft horizontally between phases. Thus, the center conductor was displaced 10 ft vertically, with outside phases in the upper position to provide greater vertical clearance nearest to adjacent trees. Cornet Bay conductors are in a horizontal plane with 20-ft spacing.

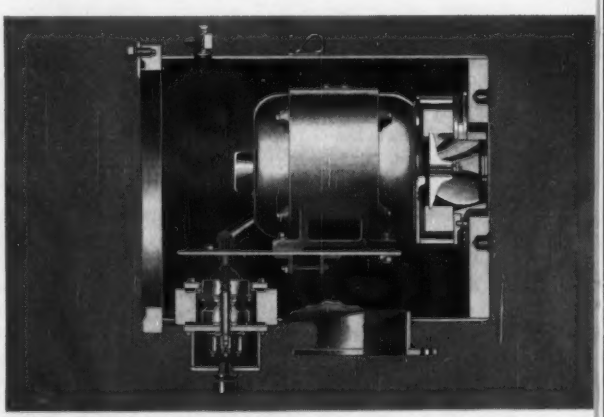
OPTIMUM INVESTMENT* Power Transformers

IMPORTANT MILESTONE of 25,000,000 KVA of FOA capacity shipped by G.E. was reached earlier this year. Increased purchases mean next 25 million KVA should be built by 1961. Unit was shipped upright for easy installation with all accessories on the same flatcar.

*Optimum Investment

Your assurance of lower long-term cost, plus greater dividends from your large power transformer investment, through:

- **LOW ENGINEERING COST:** G-E field services reduce your engineering expense.
- **LOW PURCHASE COST:** Skill to produce optimum design for each application.
- **LOW INSTALLATION COST:** Upright shipment, one-piece tank speeds handling.
- **LOW OPERATING COST:** Permanent, better characteristics for lasting economy.
- **LOW MAINTENANCE COST:** Product improvements and few failures reduce outages.



EXCEPTIONALLY RELIABLE PUMP MOTOR is key to acceptance of FOA units—fewer than ten have ever been removed from service for any reason. Pump can be mounted in the ideal hydraulic position above unit coolers.

Utilities save $14,000,000 in 19 years by using G-E FOA power transformers

Milestone of over 25,000,000 KVA of forced-oil-air cooled capacity in service typifies big, first-cost savings available to utilities.

Large capital savings may be possible when you purchase a power transformer. Consider cooling methods. Earlier this year, the power transformer containing General Electric's 25 millionth KVA of FOA (forced-oil-air cooled) capacity was shipped. Compared to the price of more costly units which would have been built with other types of cooling, utilities saved over $14,000,000 in capital expense.

Such first-cost savings are available to power transformer users who choose FOA cooling. In other areas too, such as reduced BIL (basic impulse insulation level), three- or single-phase, and auto- versus conventional transformers, significant capital savings may be possible for a specific application. These savings are made possible by continual product improvements.

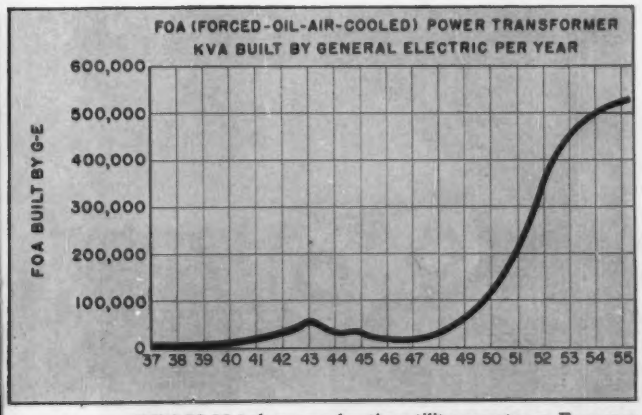
IMPORTANT FEATURES of FOA cooling are the directed-flow concept, the reliability of the oil pump, and the ability to operate for a specified period without auxiliary power. The directed-flow design, introduced by G.E. in 1937, coordinates the amount, velocity, and paths of pump-driven cooling oil. This cost reduction is made possible, basically, by substituting low-cost electrical energy (to operate pump motors) for the high-cost extra copper and steel that would be required by self-cooled designs.

OIL PUMP RELIABILITY, which permits the G-E pump to be located in the optimum hydraulic position on top of the unit cooler—giving a positive oil pressure inside the heat exchanger—is proved by the fact that fewer than 10 pumps, out of the nearly 2000 in service, have ever required removal for any reason. At least one hour's operation at full load, without auxiliary power, depending on previous loading, permits the application of FOA units even in unattended substations.

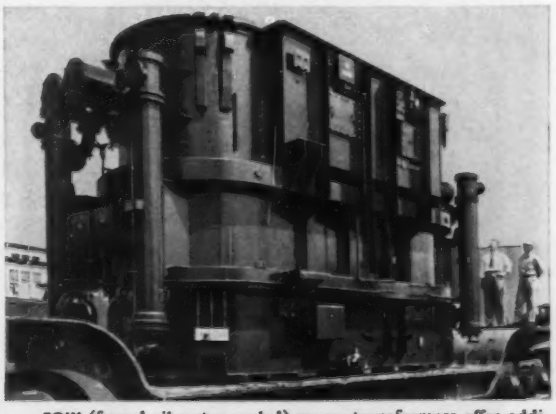
These are examples of features designed to give you a low purchase price. There are more. And, combined with other features that give low operating, installation, maintenance and engineering costs, they make your General Electric Power Transformer an *Optimum Investment.* General Electric Company, Schenectady 5, New York. 421-40

Progress Is Our Most Important Product

GENERAL ELECTRIC



TREND TO FOA shows accelerating utility acceptance. Economy and reliability have led to fact that 65% of large power transformer KVA, currently being shipped by G.E., is FOA.



FOW (forced-oil-water cooled) power transformers offer additional economies where adequate water is available for cooling transformers. Shown is 275 MVA unit.

TRANSMISSION—Construction

Steel-Hauling Rig Proves Timesaver

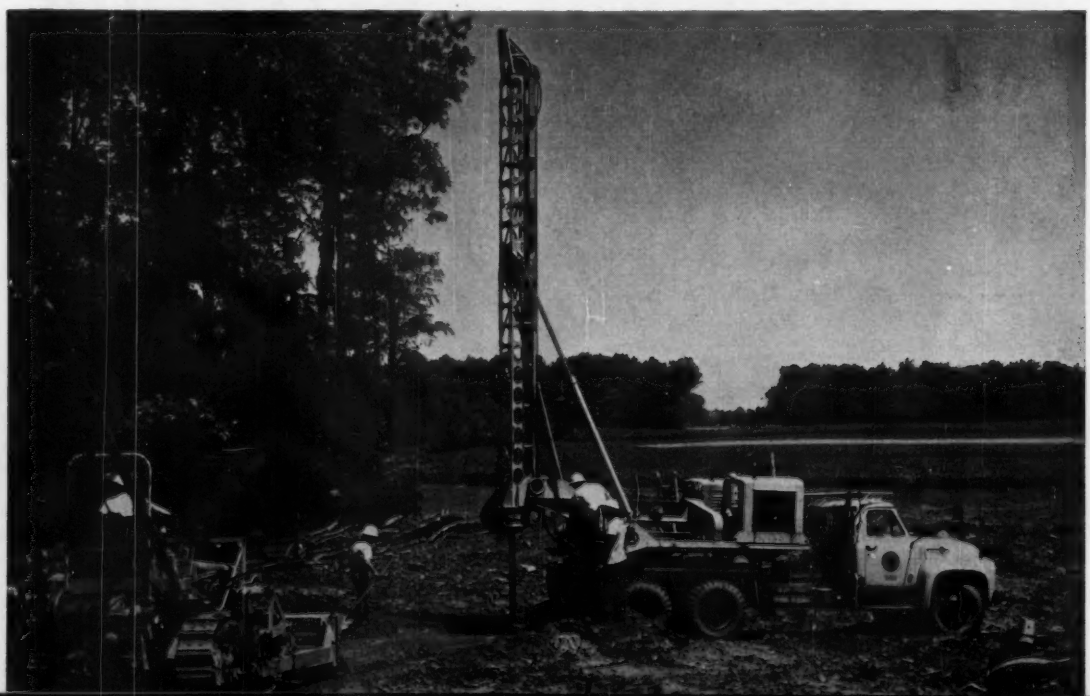
R. V. NUSS, Construction Supt., Lines, J. D. GRAVER, Supervisor, Methods and Practices, Pennsylvania P & L Co, Allentown, Pa.

The rig which hauled steel to tower sites on Pennsylvania Power & Light Co's Martins Creek-Siegfried 220-kv line is believed to be the only one of its kind used for this purpose.

Having a 7-ton capacity, the rig is equipped with davits in the front and rear of the truck body along the longitudinal center. The davits operate on either side of the truck body and can be raised or lowered with the load, enabling workmen to pick up the load from the ground and place it on the body or vice versa. Davits and cables are operated hydraulically from the cab. This piece of equipment contributed to a 41% saving in handling and hauling steel on this line.

The 25-mile line between Martins Creek Station and Siegfried Substation required 123 steel towers to support it. It was recently completed over a terrain that offered far from ideal conditions for excavation.

A heavy-duty hole digger was used to excavate for tower foundations, often in firm yellow shale. This digger, powered by two 254-cu-in engines with torque converter and coupled through a 3½-in. Kelley bar to drive augers, bell reamers, or rock core barrels, provided holes 34, 42, and 66 in. in dia and 8 to 13 ft deep. Controls, including stabilizing jacks, are operated hydraulically.



NEW MD5 HYTOOL

lightweight champ with a heavyweight punch!

MD5 HYTOOL Installs Hysplices on #4, #2, 1/0 and 2/0 ACSR
Aluminum up thru 1/0, copper up thru #2 and
Crimpits, Eltaps, Linkits, etc. up thru 1/0

Jaw variations make this the versatile, durable tool you can afford to put on every truck. Low in cost, big in performance this new 4¾ lb. MD5 delivers a 6000 lb. force to install a range of distribution connectors on all conductors through 2/0 ACSR.

It's designed to stand the roughest field treatment. Jaws are of heat treated steel. A set screw adjustment compensates for wear. Die letters or numbers on each groove correspond to connector markings to assure correct crimping. Handle grips color-coded for easy identification.

Your Burndy representative will be glad to demonstrate the advantages of the MD5.

BURNDY

56-14

Norwalk, Connect. • Toronto, Canada • Other Factories: New York, Calif., Toronto • Export: Philips Export Corp.

At Mississippi State College . . .

EE Seniors Study in Power Systems Lab

Power majors get detailed training in system operation. Assignments include steady-state and transient phenomena, abnormal conditions, and relay and circuit breaker usage

H. C. SIMRALL, Head, and **P. B. JACOB, JR**, and **J. C. McKEE**, Associate Professors, Electrical Engineering Dept, Mississippi State College, State College, Miss.
W. M. EMMONS, Manager, Switchgear Div, SE Region, Westinghouse Electric Corp, Atlanta, Ga.

A power systems laboratory at Mississippi State College is giving power majors detailed training in system operation and engineering. Believed to be the only one of its kind, the new laboratory is used by electrical engineering seniors as part of a year's course in problems they may encounter in power company work after graduation.

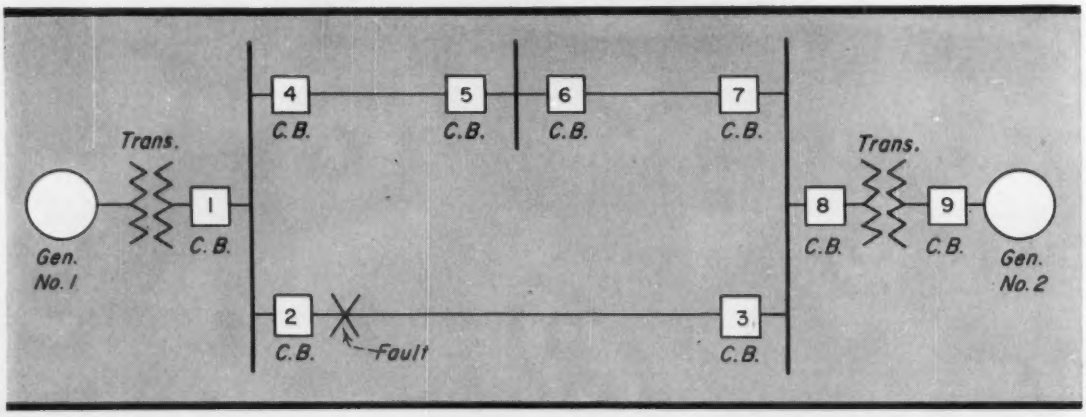
In keeping with the prime purpose of the laboratory, every effort has been made to include special features that coordinate with the course on power system analysis. Broad system aspects are emphasized. Thus, topics that may be studied effectively include steady-state and transient phenomena, abnormal conditions, and relay and circuit-breaker application. These broad studies are made possible through the flexibility of connection and instrumentation of many simple two-machine system layouts.

The laboratory consists of a group of components that can be inter-connected to form several different types of systems in miniature. It utilizes actual equipment, such as generators, relays, and circuit breakers. Components were selected to represent, as nearly as possible, actual conditions that might be expected in a power system. And because of space limitations and for safety reasons the components operate at relatively low voltage and power output. Yet they fulfill the foregoing requirements.

For example, the generators are 11-kva, 240-v, 3-phase units with added fly wheel to simulate much larger machines. The generators and associated transformers can be connected either wye or delta, grounded or ungrounded. Connections are made on switchboard panels where all components, including relays and some meters, are terminated to facilitate plugging in various combinations.

In actual laboratory work, the student connects one of

THIS TYPICAL TWO-MACHINE POWER SYSTEM CAN BE REPRESENTED IN MISSISSIPPI COLLEGE LABORATORY



SENIORS IN ELECTRICAL ENGINEERING GET PRACTICAL TRAINING IN MODERN POWER SYSTEMS LABORATORY

the possible systems and proceeds to study steady-state load division, power-angle relations, and both static and synchronous capacitor applications. Next, short-circuit calculations are made analytically, and checked approximately by means of a dc network calculator. The student may then fault the system and record transient conditions, using an electromagnetic oscillograph which can be inserted at any point to check calculations.

Later during the year's course, calculated information is used to determine relay coordination for fault clearing at any point in this system. Relays are set, the system faulted, and resulting relay and circuit-breaker performance observed.

Next, the student verifies calculated values of transient stability and machine swing limits during system disturbances. With critical clearing times determined by equal-area criteria, the student adjusts relays for detecting and clearing a given fault, without losing synchronism in the system.

Here are components in the system:

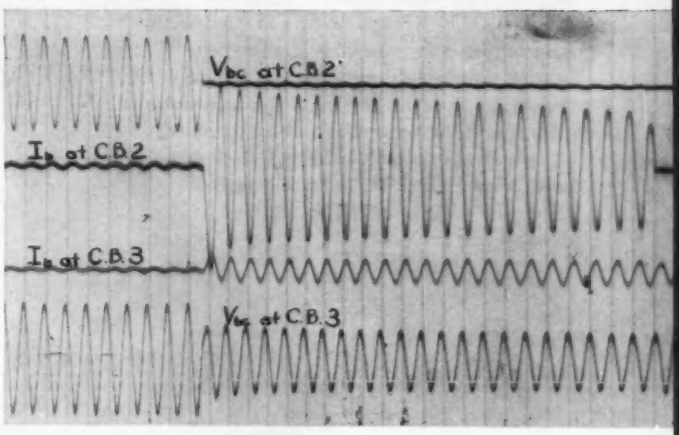
Two synchronous generators, rated at 11 kva, 240 v, 3 phase, are directly connected to dc motors. Fly-wheel inertia is added to each unit so that the natural period of oscillation simulates that of actual machines. Excitation and voltage regulation are provided by electronic exciters.

Each of four transformer banks has three, 5-kva, 240-240/120-v, single-phase, dry-type transformers. These are connected to a switchboard to facilitate interconnection.

Each of eight line sections consists of reactors with the proper ratio of resistance to reactance to represent 25-mile long transmission circuits. The lines are designed to take into account mutual reactance, and shunt capacitance is represented with fixed capacitors lumped at appropriate points in the system.

One synchronous condenser, an exact duplicate of the generators, is provided.

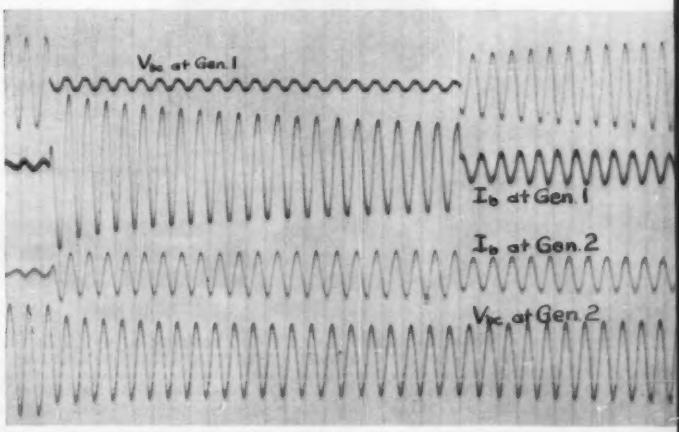
The 12 electrically operated circuit breakers have various types and combinations of relays to illustrate different relaying schemes found in actual systems. Generators and associated transformers are protected with differential relaying. Several types of overcurrent, reverse current, and distance relaying are provided on other breakers.



▲

RECORD (above) of line voltage, V_{bc}, and line current, I_b, at circuit breakers 2 and 3 for fault between lines b and c at X in system shown opposite. Below is record for same conditions taken at terminals of 2 synchronous generators

▼



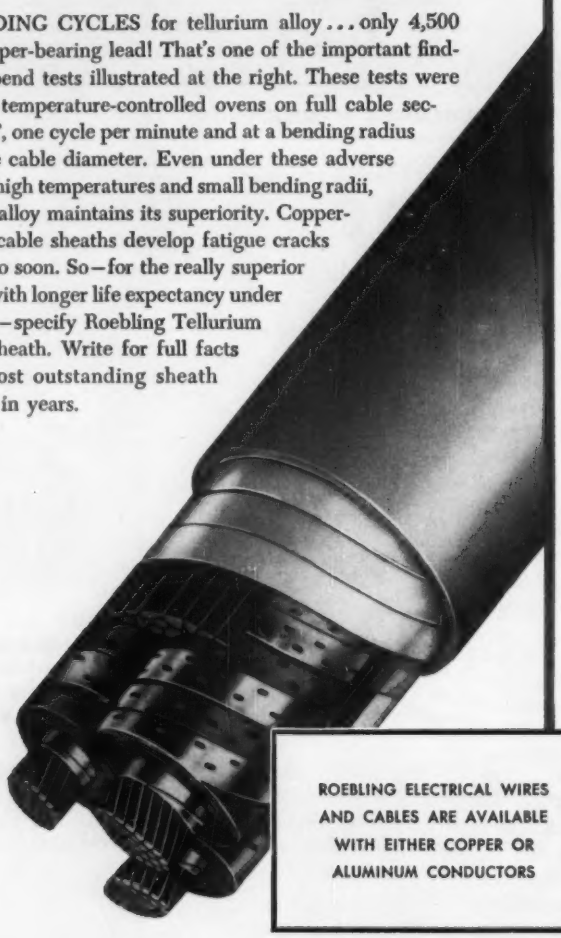
ROEBLING PAPER POWER CABLE WITH TELLURIUM LEAD ALLOY SHEATH

TELLURIUM LEAD ALLOY HAS

4½ TIMES

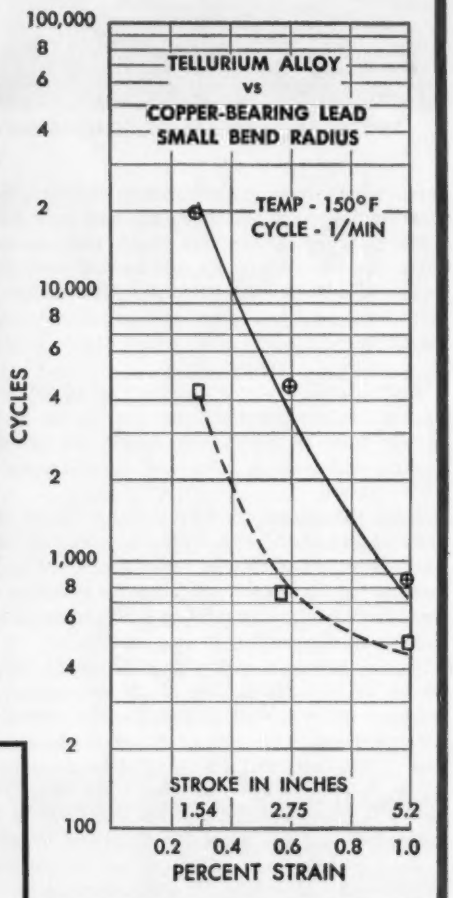
THE FATIGUE RESISTANCE OF COPPER-BEARING LEAD AT A BENDING STRAIN OF .3%

20,000 BENDING CYCLES for tellurium alloy . . . only 4,500 cycles for copper-bearing lead! That's one of the important findings from U-bend tests illustrated at the right. These tests were conducted in temperature-controlled ovens on full cable sections at 150°F, one cycle per minute and at a bending radius of 7 times the cable diameter. Even under these adverse conditions of high temperatures and small bending radii, the tellurium alloy maintains its superiority. Copper-bearing lead cable sheaths develop fatigue cracks *and fail* far too soon. So—for the really superior cable sheath with longer life expectancy under all conditions—specify Roebling Tellurium Lead Alloy Sheath. Write for full facts about the most outstanding sheath development in years.



U-BEND FATIGUE TEST

3/C - 350,000 CM - 2.7" DIA
BEND RADIUS - 19" - 7 x DIA
⊕ TELLURIUM ALLOY - 320° F QUENCH
□ COPPER BEARING LEAD



ROEBLING ELECTRICAL WIRES AND CABLES ARE AVAILABLE WITH EITHER COPPER OR ALUMINUM CONDUCTORS

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4901 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1733 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

Group discussion is part of . . .

CP&L's Management Course

Central P&L's top executives, supervisors, and staff employees attend week-long seminar lectures which are brought to them

Central Power & Light Co has brought the "mountain" of management training courses to its top executives, supervisors, and staff employees.

The second week-long management seminar sponsored by the CP&L was held recently at Bayview in the Rio Grande Valley of Texas.

For several years CP&L has sent many employees from foreman on up to management to a course sponsored by various universities. This plan limited the number of men who could be enrolled.

"Under the new program, more employees can receive management training in a shorter time," CP&L's Director of Employee Relations L. D. Collins pointed out.

Collins said the course is also unique because the company's president and vice presidents have enrolled in it.

The 18 members of the recent seminar heard daily lectures by Dr Louis Hackemann of Hackemann & Associates, San Francisco. His talks were supplemented by discussions of company operations by CP&L executives.

Later the class divided into three smaller groups to discuss and solve hypothetical management problems in the areas of interviewing, counseling, employee morale, and understanding human behavior.

At the conclusion of the course the class took confidential personality and intelligence tests to be explained later in private counseling sessions by Dr Hackelmann.

CP&L has scheduled another seminar tentatively for October.

New Mexico PS, IBEW Sign 3-Year Labor Pact

Public Service Co of New Mexico and Local 611 IBEW recently agreed to three-year labor contract which provides for an equivalent increase of 5% the first year and 4.17% the second. For third year, contract may be reopened for wages only.

With an effective date of Mar. 1, 1956, the contract provides for a 2.7% cash increase. The company will extend hospitalization benefits which are equivalent to 1.8% of the payroll. Because employees do not pay income tax on hospitalization benefit premiums paid by the company, they have divided the 1.8% increase by 0.78 to obtain an equivalent of 2.3%. Thus, for the first year the wage increase is equivalent to a 5% pay hike.

Effective Mar. 1, 1957, there is an increase of 2.5% in cash and the company will assume the employee's contribution to the present hospitalization plan. These contributions are equivalent to 1.3%. Thus total increase for the second year could be computed as 3.8%. However, dividing the 1.3% fringe benefit by 0.78 produces an equivalent of 1.67%, for a total equivalent wage increase of 4.17%.

Included in the contract is a clause which provides for a reduction of the contract to a two-year term should the international union object to the three-year contract period. However, the company reports it has been advised that the International will approve the longer term.

Illinois Power Institutes Two $1,000 Scholarships

The Illinois Power Co has announced it has established two scholarships at the Illinois Institute of Technology, Chicago, each for $1,000 and each of a two-year duration. The first scholarship will be awarded starting with the fall semester of 1956 to a junior student of power engineering at the Institute. Another will be awarded to a junior student in the fall of 1957, and thereafter a scholarship each year.

One condition of the scholarships is that the recipients should be, by preference, a resident of the area served by the Illinois Power Co. If no students from the area qualify the honors then may pass to residents outside of Illinois Power area.

These scholarships are in addition to the contributions made by the company to many colleges and universities in its territory, through the Associated Colleges of Illinois, Inc.

FOOD SERVICE AWARD WINNERS: R. I. Bull, left, Ohio Power; Ralph Layfield, Georgia Power; John Newhouse, Northern States Power; Nick Patnay, Penn. P&L. D. W. Grosshandler, "Food Service," A. J. Sagner, Star Mfg. Co presented prizes

Turnpikes Boosting Kwhr Sales

500-kw loads are going into food service facilities along Indiana's new super highway, EEI Commercial Cooking Conference told

That commercial cooking stands to gain—and gain handsomely—once President Eisenhower's giant new highway construction program gets rolling is evident. A whole new crop of restaurants and drive-ins will be needed to feed the millions of motorists who will take to new superhighways as they ribbon out across the country.

A glimpse of just what all this can mean to utilities was given by Indiana & Michigan Electric Co's Dallas Milem at Edison Electric Institute's Commercial Cooking Conference, May 8, at Chicago. He described five food service centers, each with a 500-kw cooking load, going up along Indiana's new freeway.

Little Investment Needed

Pointed out Milem: "The utility is normally called on to furnish power for lighting, sewage treatment, well pumps, and air conditioning. Once pole lines are in for normal usage, there is little more expense involved in increasing transformer size to accommodate additional load—good load factor equipment contributing good revenue for a small additional investment. In the case of the Indiana Toll Road normal requirements for five centers were: 1,110 kw of lighting; 225 hp sewage treatment; 150 hp well pumps; 500 hp air conditioning. This makes a total of approximately 1,767 kw.

"However, cooking contributed an additional 2,580 kw. How many industries and commercial businesses with a connected load of 2,500 kw can you pick up in a week, a month, or a year?"

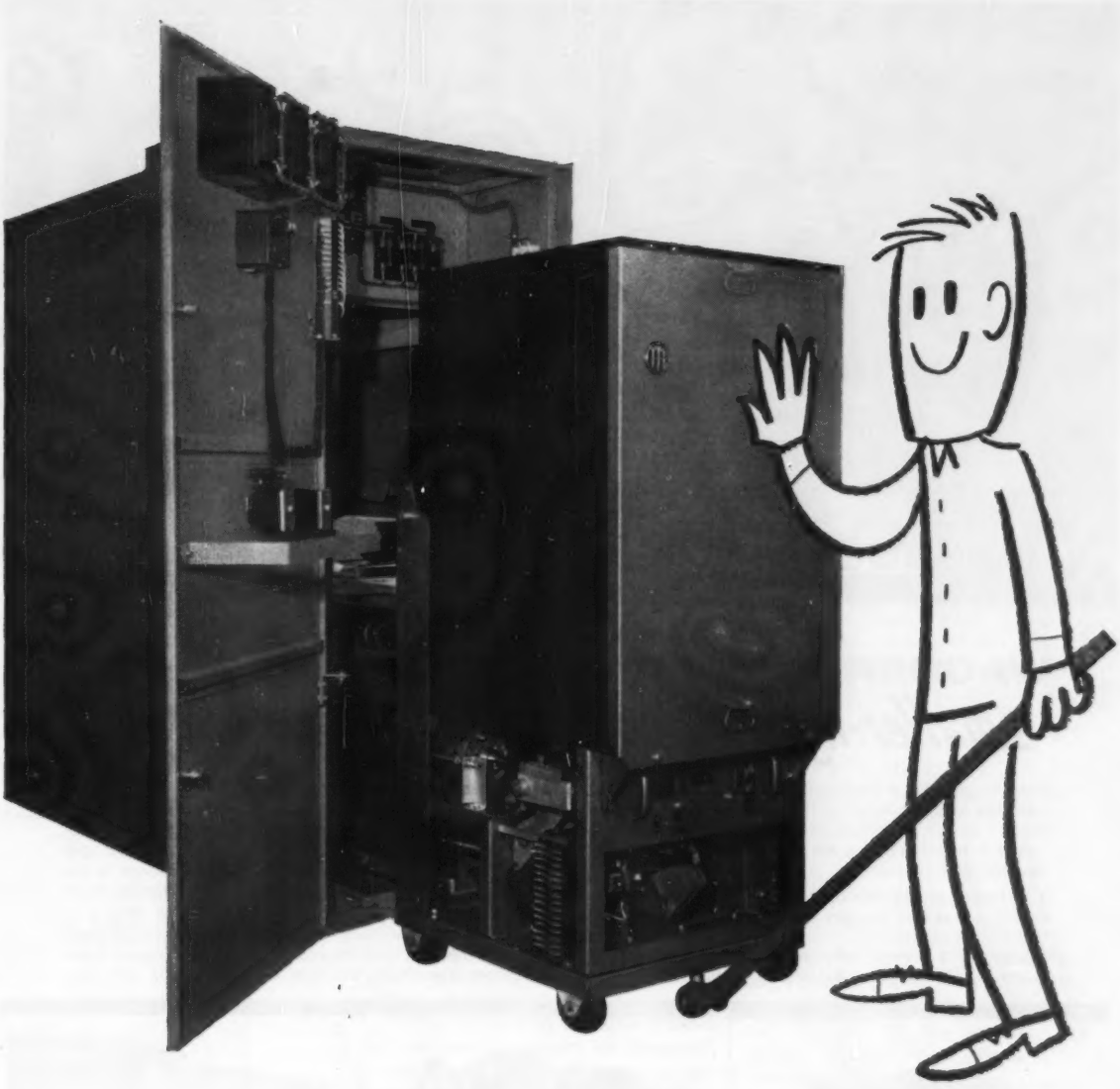
Electric heating also was seen as a way to extend power use not only along the throughways but in all food service markets. Each salesman can double the business he connects just by watching for opportunities for small heater applications, said W. S. Eyth, Edwin L. Wiegand Co. His suggestions: Supplemental water heaters to provide 180F water; conversion heaters for steam tables; snow melting devices and bucket heaters for hot water in gas stations, used-car lots, etc; space heating in reception areas, at loading docks, and at building entrances.

But basic to getting any commercial cooking and heating installed is the willingness of the dealer to sell. "We get so close to the dealer that he won't sell gas equipment," declared Ralph Layfield who described Georgia Power Co's highly successful dealer cooperative program. "Eighteen months ago our dealers didn't have a single piece of commercial electric cooking equipment on display. Today they showcase as much electric as they do gas." Layfield said his company in 1955 made 818 installations, of these 166 were all-electric kitchens, for a total of 11,124 kw—a 72½% increase over 1954.

Award Winners Named

Five power companies were given special recognition for their work in promoting cooking sales. To E. P. Gross, Hartford Electric Light Co, went EEI's Data Sheet Award for the best case study of a new all-electric commercial cooking operation. Food Service Utility Awards, sponsored by Food Service magazine, were presented to Ohio Power Co, first prize winner; Georgia Power Co, second; and Northern States Power and Pennsylvania Power & Light Cos who tied for third.

Before the cooking specialists adjourned they were briefed on new products by representatives of Hotpoint Co, Griswold, Raytheon, Star, Vulcan-Hart and Wells manufacturing Cos. Raytheon's Ralph Leader blamed servicing and distribution problems for holding up wideopen sale of his company's commercial Radarange.

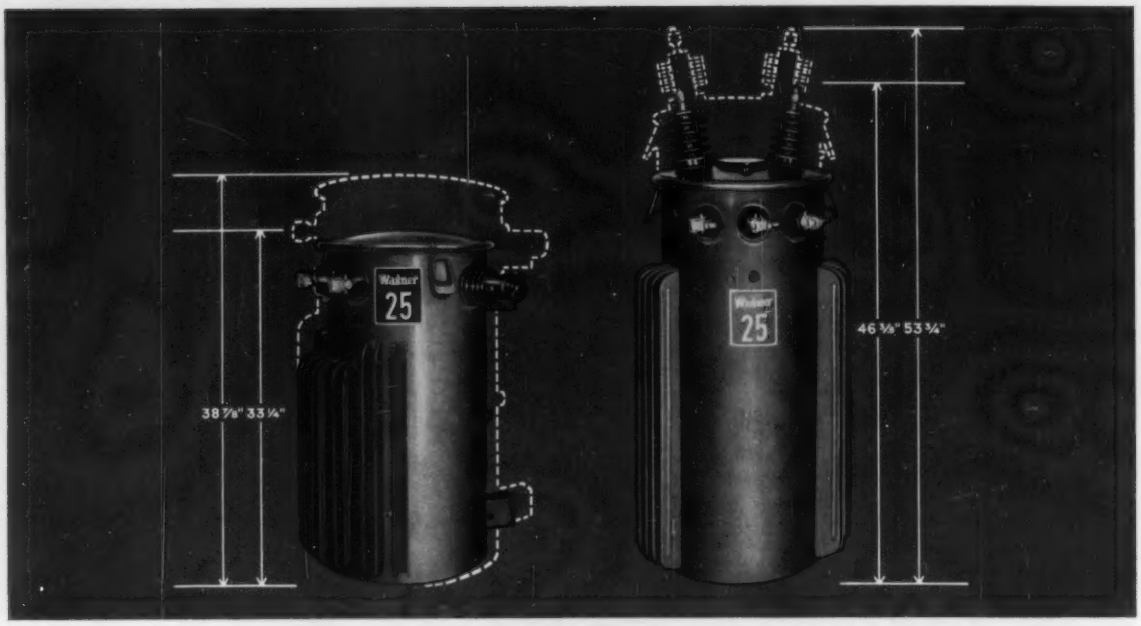


I-T-E Metal-Clad Switchgear—positive protection through 500,000 kva

Made in 3 basic voltage ratings (5 kv, 7.5 kv and 15 kv) with interrupting ratings of 150, 250 and 500 mva. Throughout this line of modern gear, time-proved features add extra value. Horizontal drawout circuit breakers are jig fitted to enclosures. Rigid welded frames and housings can be lifted as a unit without loss of alignment. Use of porcelain and epoxy insulation, plus complete isolation of compartments, provides safety and continuity of service.

Why not take advantage of I-T-E quality—it means years longer trouble-free service in your plant. For more information, contact your nearest I-T-E sales office. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division



WAGNER DISTRIBUTION TRANSFORMERS

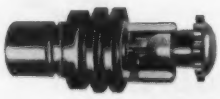
smaller-lighter-easier to handle and install

Now Wagner Form W Distribution Transformers are substantially smaller and lighter than ever before . . . up to 25% shorter in the important overall height dimension—17% lighter in weight. Yet they are liberally designed for excellent electrical performance.

This means greater ease of handling—speedier installation. It also means that you can save money by putting greater transformer capacity on your existing structures . . . handle heavier loads without installing new poles. All these new Form W Transformers, in ratings 15 through 167 Kva, 15 KV and below, can be pole mounted.

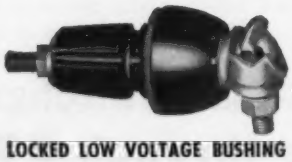
Such reductions in size and weight are made possible by improvements in core and coil construction. A special resin coated insulating material is used for layer, channel and barrier insulation. Heat treating bonds this insulation to the coil conductors to give the coils exceptionally high mechanical and electrical strength.

These new, lighter shorter Form W Transformers will meet your distribution requirements. Consult the Wagner Sales Engineer in your area for complete information.



HIGH VOLTAGE SIDEWALL BUSHING

For use with either copper or aluminum conductor . . . safety-designed for faster, easier connections, without tools. Porcelain and terminal are locked in position.



LOCKED LOW VOLTAGE BUSHING

The bushing and terminal are key-locked to prevent rotation . . . on loose terminal connections to cause internal shorts. Suitable for copper or aluminum conductor.

SHUR-SEAL CLAMPING RING

Keeps transformers sealed air-tight . . . no atmospheric moisture or dust particles can get inside.

INHIBITED OIL—reduces oxidation to a minimum . . . retards formation of acids and sludge.

Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

T56-14

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

SALES AND SERVICE

Nightime Golf: Utility Cards 24,000-Kwhr Off-Peak

The Arroyo Seco golf course may be incurring the wrath of South Pasadena, Calif. golf widows. It's having success, though, in its main aim—a boost in profits—by giving dubbers 4-5 hours of extra nightime golfing.

The use of 193.5 kw of overhead lighting on the 18-hole course also provides Southern California Edison Co with a profitable load—an increase in consumption of up to 24,000 kwhr monthly.

The course has holes varying from 90 to 130 yd, all par 3. Described as the only lighted golf course west of the Mississippi, it is illuminated by 39 steel standards. There are 129 open porcelain-enamel RLM reflectors, each holding a 120-v, 1.5-kw clear lamp. A 480-v underground distribution system, consisting of copper conductors with TW insulation in conduit, serves the standards through dry-type transformers.

Cost of the lighting job was about $40,000. Total consumption in one winter month, including a 137½-hp pumping load for watering, was 43,840 kwhr. Total demand for the course has reached 250 kw.

S&S SHORTS

Color Ads Aid Dealer Sales

Large, color newspaper advertisements are sparking Utah Power & Light Co's promotion "Buy from your dealer." Announced in a 44-page dealer booklet produced by its Business Development Dept, the ads will appear regularly in 66 newspapers.

Lighting Booklet, Film by Sylvania

"Better Lighting for Bigger Sales in Hardware Stores" is a retailers booklet available free at Sylvania Electric Products, Inc, sales offices. It has also produced 18-min filmstrip on farm lighting; price is $10. Write Sylvania, 1740 Broadway, New York 19, N. Y.

Cooling Comments

Research on solar cooling "some day may lead to sun-operated air conditioning for the home." This is General Motors Corp view based on work at its Frigidaire division's Dayton, Ohio, study center.

'Horsepower' Rating Misleads

Customers are getting a false idea of central cooling costs by manufacturers' horsepower ratings for units that "fail to give an accurate measure of the cooling capacity of air-cooled, central type air conditioners." This charge of Bruce D. Henderson, Westinghouse Electric Corp, at New York meeting of company's distributors and dealers, was based on unit studies of various brands that often interchange terms "compressor hp" and "ton of cooling capacity." He urged the air conditioning industry to join forces to establish proper ratings.

Shorties:

Hotpoint Co, new entry in the TV field, expects sales of more than 100,000 sets this year . . . North Central Electrical League gave 1,011 Adequate Wiring Certificates in Minneapolis, St. Paul area last year, a new high . . . About 88% of South Carolina farms have electricity, but only 40% have running water, says the state's Co-op News.

Lighting Ideas

A packet of "Home Lighting Ideas for Kitchens and Bathrooms" by Illuminating Engineering Society is available for 50¢. It has data for ten typical arrangements, new and remodeled, using latest lighting. Contact Publications Office, IES, 1860 Broadway, New York 23, N. Y.

Competitor's Corner

A Spring Matchless Gas Range Campaign is underway. The ten-week promotion, backed by ten gas range makers and 12 eastern utilities, has slated 1) over a million lines of newspaper advertising, 2) heavy TV, radio schedules, and 3) a $43,000 kitty for a dealer-salesman contest. The gas companies serve 1,750,000 residential customers in big portions of Kentucky, Maryland, New York, Ohio, West Virginia, western Pennsylvania, and parts of Virginia. Nylons selling at half price are traffic builders for dealers' stores, display rooms.

'Franklin' Opens L&N Plant

Leeds & Northrup Co's new instrument manufacturing plant at North Wales, Pa., was opened formally in mid-May by Pres I. Melville Stein. Among the guests were officials of the Franklin Institute in Philadelphia. In his opening address Stein said, "We are gathered here also to do honor to Benjamin Franklin, this year, 1956, being the 250th anniversary of Franklin's birth."

The opening ceremony was unique. After introducing the Franklin theme, President Stein arranged the official unsealing of the main entrance to the plant. He invited an actor dressed to resemble Benjamin Franklin, the scientist and statesman, to join the group.

"Franklin" advanced, rubbing a glass tube with a cloth to generate static electricity. When the tube was brought near a sphere (see above), the latter developed an electric charge on its surface. An L&N amplifier stepped up the charge, a Speedomax recorder's pointer spun upward, a firing device issued sparks, and a flash of flame shot along a tape, unsealing the doorway.

The building is a single-story structure with some mezzanine areas; total floor area is about 270,000 sq ft, or over 6 acres. It is located on a 129-acre tract. Land and buildings cost about $4 million, contents and inventory about $7 million. This plant will provide work for about 1,300 people. The investment is about $8,400 per worker in plant alone.

The building is designed to operate with windows closed during winter and summer.

Connected electric load is 705 kw. Power is supplied by Philadelphia Electric Co at 34.4 kv to substations; secondary distribution is 480 v. The 3,200 lighting fixtures have about 7.5 miles of fluorescent tubing. Electrically heated equipment ranges in demand from 45-kw Homo heat-treating furnaces to restaurant equipment, soldering furnaces, and glue pots.

North Wales plant will be devoted to manufacture of Speedomax recorders and recorder controllers, Metermax combustion controls, L&N load-frequency controls, and other automatic instrumentation.

Headquarters and manufacture of other products are continued at 4901 Stenton Ave, Philadelphia, Pa.

Financial Structure . . . Capitalization which became effective late in 1955 consisted of 246,840 common shares, par $1; 129,060 shares of Series A 5% $25 par preferred stock; and 43,020 shares of Series B $25 par preferred stock, convertible into common at $21 per share. Authorization exists for common stock to a total of 600,000 shares. In addition to the sinking fund applying to the Series A preferred stock, the Series A and Series B preferred stocks may be retired, in whole or in part, by action of the directors of the company.

New UHS Insulator

. . . developed by GE has high strength, small ceramic size

A suspension insulator which now combines ultra-high mechanical strength with small size makes possible major economies in transmission line design. This was revealed recently by P. R. Hartig, general manager of General Electric Co's insulator department at Baltimore, Md. Known as the "UHS" suspension insulator, it is slated for early production.

By use of a new porcelain body, the UHS unit is reported to have combined mechanical and electrical strength rating of 36,000 lb, and impact strength of 100 in.-lb. Nearest comparable standard insulator is the EEI-NEMA class 52-7, clevis-type unit rated at 36,000 lb.

Dimensions of the UHS unit's porcelain shell is about equal to EEI-NEMA class 52-5 insulator rated at 25,000 lb (M&E) and 60 in.-lb impact.

Deadends, angles, river crossings, and bundled conductors are the specific applications.

Cost of the UHS unit, according to company spokesmen, is expected to be slightly less than two 25,000-lb class 52-5 suspension insulators.

S&C Plans Interruptor for Cutouts, Disconnects

A portable interrupting device, the load interruptor tool, is ready for production, John Conrad, president of S&C Electric Co, recently advised. The tool may be attached to an open type cutout or a disconnect switch for conversion into a temporary load interruptor. Afterwards, the tool is detached for use elsewhere.

The device will have a nominal rating of 15 kv, Conrad said, and will interrupt safely any load current of 400 amp or less at system voltages from 2.3 through 14.4 kv. Designed for use on primaries of distribution transformers, sectionalizing points, or for capacitor switching, the tool will reportedly withstand daily field usage.

(*More M & M on page* 59)

SELKYD–a new kind of plastic improves watthour meter base plates

and Sangamo brings it to you!

In order to find the ideal material from which to mold watthour meter base plates, Sangamo and Glaskyd, Inc., pooled their efforts.

The result is Selkyd.*

A Selkyd base plate on a watthour meter has many advantages. It resists corrosion. It has a high resistance to arc tracking. Having great impact strength, a Selkyd base plate will stand up to physical punishment. And because Selkyd is an inert organic substance, base plates made from it have great dimensional stability.

Adoption of this Selkyd base has in no way altered the electrical characteristics of the J2.

Every Sangamo J2S meter you buy will come to you with a base plate made from this remarkable new plastic . . . and at no extra cost.

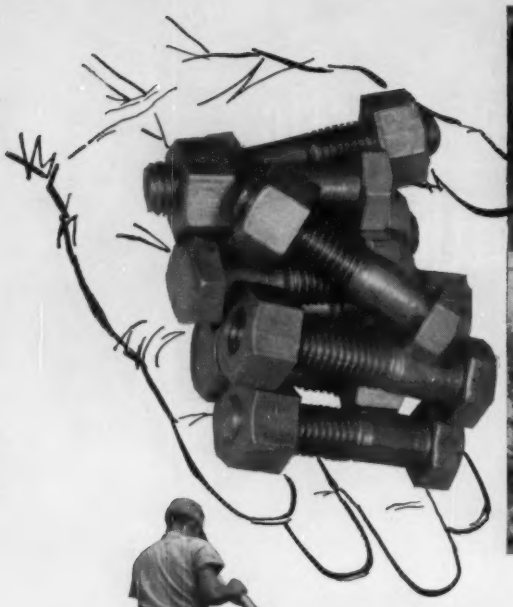
Selkyd base Sangamo meters will be shipped to you sealed. You'll find them so accurately calibrated . . . so solidly built . . . that no adjustment is necessary.

**A thermosetting resin combined with glass fibers—in contrast to ordinary phenolics having wood fibers as a filler.*

JM56-3

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS



SIMPLICITY of

Thorex lightning arrester pays dividends in cost and protection

Only nine stacking bolts!

This 230-kv Thorex lightning arrester, 12½ feet high, consists of only four units. Three simple 3-bolt connections add practically nothing to construction time. The entire pole was completed in less than 30 minutes. This kind of time-saving has a real dollar value -- it makes Thorex arresters a better investment.

There's an operating angle to this of equal importance. In this 230-kv stack, there are only eight seals. Air and moisture are the enemies of an arrester. Regardless of how good the seals may be -- and we make good ones -- it is only plain common sense that fewer seals means greater safety.

Nobody wants a bargain in lightning arresters, unless it is a mighty sound bargain. But, add-up these factors: The finest grade of equipment protection - Lower construction costs - Higher reliability. How *better* could you spend your money?

OHIO BRASS COMPANY . MANSFIELD, OHIO

Ohio Brass

4634-H

10,000-Mva Circuit Breakers Shipped by A-C from Boston

These 10,000-mva interrupting capacity Pneu-Draulic oil circuit breakers were shipped recently from Allis-Chalmers Mfg Co to a California utility. The units are reported to be the largest in physical size and have the highest interrupting rating of any 230-kv breakers built at Allis-Chalmers Boston Works.

Two double-break Turbo Jet arc interrupting devices per phase provide four interrupting breaks in series per phase to interrupt the circuit within three cycles, and a fully mechanically trip-free Pneu-Draulic operator provides closing force to meet all present and anticipated closing and reclosing requirements.

The breakers were shipped completely assembled except for bushings and interrupting devices.

Submarine Link to Begin For British Columbia Co

Work is expected to begin early this month on cable-laying for British Columbia Electric Co's submarine link between their transmission system in the southern part of Vancouver Island to British Columbia mainland's hydro resources near the Fraser River's mouth. The 138-kv system will consist of single-core cables, each 16 miles long, and similar cables, 3.5 miles long, for an inter-island section. It is to be in operation this September at a cost of more than $3 million.

With a diameter of 4 in. and a weight of 50 lb/yd, it is described as the largest continuous long-length power cable ever to be installed. British Insulated Callender's Cables, Ltd, London, made the cable and will handle the installation.

Resume Atlantic Cable Job

Cable-laying resumed last month on the trans-Atlantic telephone cable (EW, July 4, 1955, p 56). The HMTS Monarch laid 300 miles of cable across Cabot Strait, completing the Nova Scotia-Newfoundland section. The ship returned to England to load for the laying of the second Atlantic cable. This latter operation is to start June 3. Service is expected to be established before 1957.

M&M BRIEFS

S. Morgan Smith Co of York, Pa., will build two 180-in. Smith Kaplan turbines for a Montana Power Co project. Installation will be at the H. H. Cochrane hydroelectric development on the Missouri River, seven miles from Great Falls, Montana. Each turbine will develop 42,000 hp at 128.6 rpm under a 80-ft head and drive a 30,000-kva, 0.8-pf generator. Shipment of turbines starts in 11 months, generators 12 months.

Clark Bros Co of Olean, N. Y., one of the Dresser Industries, reports an agreement has been made with Ruston & Hornsby, Ltd, of Lincoln, England, to manufacture the Markta gas turbine in the United States. This turbine is said to develop 1,300 hp.

Graybar Electric Co moved into a new office and warehouse at 50 McWhorter St., Newark 5, N. J. Frank Sweeney is manager.

MANUFACTURERS' EARNINGS

COMPANY	PERIOD MONTHS	ENDING	NET INCOME 1956	NET INCOME 1955	EARNINGS PER COMMON SHARE 1956	EARNINGS PER COMMON SHARE 1955
Aluminum Co of America	3	Mar. 31	$24,287,262	$21,167,597	$1.16	$1.02
Anaconda Co	3	Mar. 31	29,883,372	14,203,218	3.45	1.64
Blaw-Knox Co	3	Mar. 31	1,420,000	141,977	0.90	0.09
Combustion Engineering	3	Mar. 31	1,611,602	1,358,061	1.52	1.28(c)
Dow Chemical Co	3	Feb. 29	14,282,841	10,379,529	0.61(a)	0.46(a)
General Cable Co	3	Mar. 31	2,188,621	1,382,380	0.91(a)	0.60(a)
General Motors Corp	3(f)	Mar. 31	283,000,000	309,406,862	1.01	1.14
Ingersol-Rand Co	3	Mar. 31	7,276,000	6,185,467	1.20	1.02
Johns-Manville Corp	3	Mar. 31	4,110,948	2,730,699	0.64	0.43(g)
McGraw Electric Co	3	Mar. 31	3,200,000	2,223,000	1.50(a)	1.05(a)
Minneapolis-Honeywell Reg	3	Mar. 31	4,536,064	3,728,240	0.69	0.59(p)
Motorola, Inc	3	Mar. 31	2,012,876	2,153,038	1.04	1.11
Owens-Illinois Glass	3	Mar. 31	5,680,827	.....	0.93	....
Phelps Dodge Corp	3	Mar. 31	25,430,339	15,177,757	2.51	1.50
Radio Corp. of America	3	Mar. 31	12,727,000	12,568,000	0.85	0.84
Revere Copper & Brass	3	Mar. 31	3,052,265	2,991,671	2.34	2.32
Sylvania Electric Products	3	Mar. 31	4,323,086	3,247,655	1.28(a)	1.03(a)
Union Carbide & Carbon Corp.	3	Mar. 31	36,231,322	28,397,079	1.24(a)	0.98(a)

Notes: (a) Based on shares outstanding at close of the period. (c) Based on shares now outstanding. (f) Preliminary. (g) Adjusted to reflect two-for-one stock split in March, 1956. (p) Gives effect to two-for-one stock split in April, 1955.

BUSINESS OUTLOOK

Electrical World
JUNE 4, 1956

The long term outlook remains excellent. **For the short term, though, there's been a discernible weakening of confidence in the last few weeks.** More observers now expect a marked third quarter dip, and fewer expect a strong enough fourth quarter comeback to put the year as a whole much above end-1955 levels.

What seems to have been happening is that our anti-inflationary policies have been working—too well! Tight money policies and a substantial budget surplus have not only cut out excess demand. They've also temporarily removed the demand required for growth. **It's tight money that's been getting most of the blame. Actually though, the budget surplus, though less obvious, may have been at least as much responsible.**

• • •

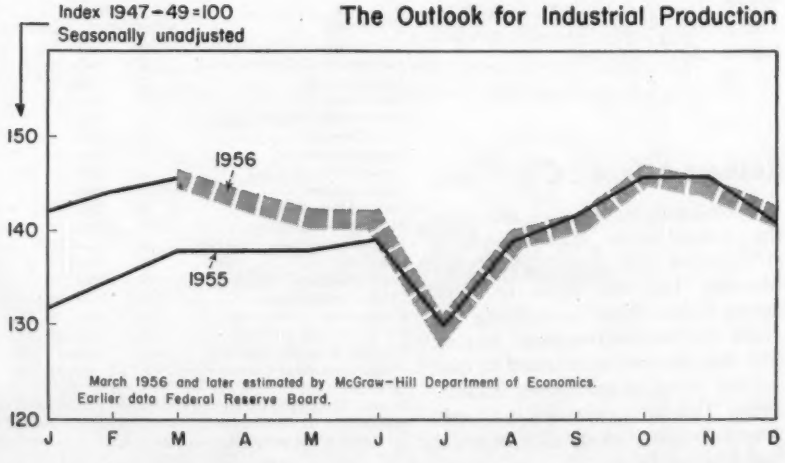
The main ingredient in the money and credit squeeze has not been the rise in the discount rate—even though that has collected the headlines. It's been the holding down of bank reserves by Federal Reserve open-market sale of treasury bills. **Actually usable reserves** (required reserves plus excess reserves, minus member bank borrowings at the Federal Reserve Banks) **have declined by a half billion dollars in the last year.** There's been a corresponding decline of around $1.3 billion in adjusted demand deposits. Meanwhile GNP has risen around $25 billion. **New growth will clearly require more credit.**

• • •

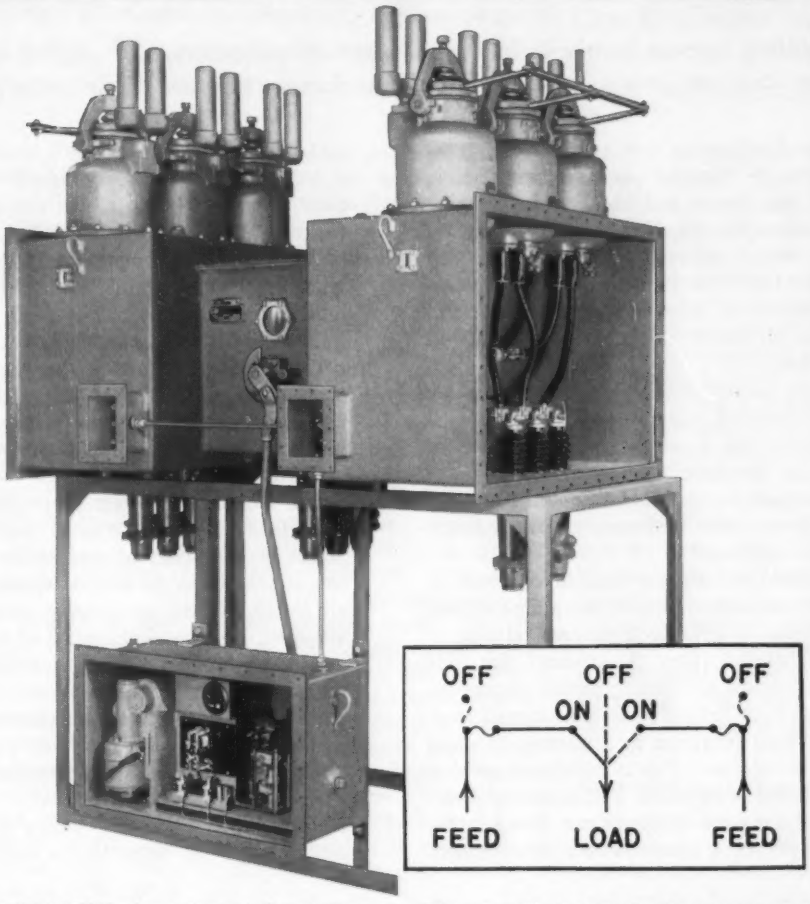
The facts on the budget surplus are a little harder to pin down. **Secretary Humphrey now estimates this fiscal year's surplus at $1.8 billion.** The Joint Committee on Internal Revenue calculates this at $2.3 billion and most experts think they are closer to the mark. **When you add to this the government's accumulation in the social security funds, you add up to around a $4 billion surplus in the cash budget.** The Federal government is taking about this much out of the cash stream that private parties have to spend. **That's a pretty solid deflationary force.**

These policies are naturally subject to change, and pressures are mounting to change them. The Federal Reserve has already promised to build up reserves a bit by buying treasury bills in June. And demand for tax cuts is mounting in Congress as the purchasing power pinch of the budget surplus is more clearly felt. It's pretty hard to believe that the Administration would resist these pressures, especially in an election year, if a significant recession seemed imminent.

The Outlook for Industrial Production



COMBINE "FC" OIL FUSE CUTOUTS WITH SELECTOR OIL SWITCHES



The "RADFC" subway fuse-switch unit shown connects the load to duplicate feeders, 12.5 Kv. 4-wire solidly grounded neutral. The automatic mechanism throws over the oil switch when the preferred feeder voltage fails—and throws back when preferred feeder voltage is restored.

The FC61 oil fuse cutouts, included for each feeder, serve as feeder isolators and fuses for overload and short circuit protection.

The automatic control circuits are connected ahead of the fuse cutouts to avoid oil switch transfer under short circuit conditions.

G&W combination fuse-switch units are helping provide flexibility and service continuity in many distribution systems—large and small. The cost is very reasonable. A minimum of maintenance is required. Your inquiries are invited—without any obligation on your part.

G&W ELECTRIC SPECIALTY CO.

7780 Dante Avenue, Chicago 19, Illinois

Representatives in principal cities of U. S. A.

Canadian Mfr.—Powerlite Devices, Ltd., Toronto, Montreal and Vancouver

CD561

IN THE INDUSTRY

Utilities Face Plenty of Competition

Hottest current battle is for new industrial customers, but utilities come up against many other competitive forces to spur their enterprise

Utility area development men are jestingly accusing each other of "pirating" industrial customers, "kidnapping" new plants, and "stealing" away home industries. Some of the jibes are becoming so pointed that there is a question as to whether they are entirely for fun. The competition for new plants and new industries is becoming more intense, and utilities make no secret of their direct efforts to corral prospects.

Some of the industrialists now being courted by the area development men are enjoying the performance. Some see it as the first real taste of competition for the electric utilities. But the truth is that utilities face many of the same forms of competition which spur other businesses and a few forms peculiar to the utilities.

The franchise, which many people conceive of as barring all competition, is good for a limited time only and subject to strict requirements relating to service standards and rates. A company that fails to meet requirements is courting public ownership.

Competition from federally and state-owned projects also has been prevalent in a number of areas for the past two decades. This is fiercer competition than the so-called competitive industries and businesses face. An electric company can be operating at a profit and providing good service to its customers and still be taken over by a government agency.

Utility engineers are constantly competing with their colleagues in their own and other companies for more efficient, economical design and operation of facilities. This competition is accelerated by the rising costs and the rather static rate structure which limits utility revenue.

In the sales field, utilities face a variety of competition. Most obvious is the battle with gas for the home appliance market. On the farm, bottled gas poses a constant threat for serving both household and farm needs. Similar competition is present in the commercial sales field.

Nor has electric power preempted the industrial sales field. Roy W. Wages, Georgia Power Co, points to a number of competitive power sources and devices which cut into utility sales. Among them are steam, oil, and gas turbines, absorption air conditioning, and chemical control of humidity.

And to further complicate utility operations is the competition from the forces of nature which poses all kind of threats to service continuity. These come in the form of heat or cold waves, hurricanes, tornadoes, sleet storms, and thunderstorms.

Any person who believes electric utilities are free of competitive threats or operate without the competitive urge had better take a closer look.

TECHNICAL NOTES

Air conditioning stimulates sweeping changes in building design. Examples are vertical fins, external shades, and heat-reducing glass to cut cooling loads; perimeter cooling from ceiling plenum chambers; baffles and resonators to silence fan noise; and use of crawl spaces for air returns.

Fuse blowings on shunt capacitors have been traced to high frequency voltage generated by arcing in a circuit breaker that failed to clear properly.

Safety begins on the drawing board.

Distribution transformers on a typical system total 2 kva per kw of system peak. Savings in distribution transformer installations contribute extensive system savings.

Conducting fluid can be pumped without moving parts by passing it through a tube which is subjected to a moving magnetic field resembling that of an induction motor stator.

Ultrasonic tests reveal defective spurs on linemen's climbers which had escaped detection by other methods.

Liquid silicone is proposed for accelerating freezing of pipe-cable oil with dry ice. It produces no gases, brings complete freeze in 6 hr, and can be reused indefinitely.

Rain making requires adequate silver iodide applied to water-bearing clouds in the right location and at the precise temperature to trigger rainfall.

FPC: Rate 'Reviewer' or 'Maker'

• William C. Chanler, attorney, told a Natural Gas Symposium recently that U. S. Supreme Court has ruled commission cannot fix a reasonable rate of return until rates are found to be unreasonable

The U. S. Supreme Court has upset the concept of the Federal Power Commission as a rate-fixing agency, says William C. Chanler of Winthrop, Stimson, Putnam & Roberts, New York City.

Rather, Chanler told the Natural Gas Symposium in New York recently, the FPC is primarily a rate-reviewing unit which may not alter a rate schedule filed by a utility unless a hearing shows it to be unreasonable.

He drew his conclusions in a discussion of the court's opinions in the Sierra Pacific Power Co and the Mobile Gas Co cases under the Natural Gas Act.

Court Decisions Analyzed

Chanler, in his analysis of both Supreme Court decisions under the type of contracts to which the decisions apply, said:

"The only issue actually decided by the court in these cases (Mobile Gas and Sierra Pacific Power) is that a fixed rate for a term of years is valid and binding between the parties and can be changed only by agreement of the parties and notice under S4(d) (205d of Power Act), or by the FPC if after a hearing under S5(a) (206a of Power Act) the contract is found to be against the public interest.

"This part of the court's decisions," Chanler said, "are clear and explicit, and obviously apply to any contract which can be construed as setting a fixed price for a term of years. Whether or not the cases would apply to various forms of service agreement now in existence, under which the price is fixed by reference to a specified rate schedule on file with the commission, depends upon the exact wording of the service agreement.

"If the agreement refers simply to a rate schedule then on file, with no reference to the possibility of the schedule being changed, it would seem that this would probably be construed as a contract for a fixed price for a specified term and would be covered by the decisions. However, when the service agreement contains such language as that the gas or power 'shall be paid for by buyer under seller's rate schedules or any effective superseding rate schedules on file with the FPC,' it would seem on simple principles of contract law that it was the intent of the parties that the rate schedules could be changed unilaterally in accordance with the provisions of S4, just like any filed general rate schedules," Chanler said.

Financial Status Impaired

"The court also set forth the standards to be observed by the commission in any proceeding to set aside a contract. The commission must find that the contract is 'against the public interest,' and this means that it must be shown either that it is so low as to impair the financial status of the utility or that it casts upon other consumers an excessive burden, or is unduly discriminatory. The commission's contention that the mere fact that the contract is unprofitable is sufficient ground for setting it aside was expressly overruled."

Rate Reviewing vs Rate Making

Under the heading "Broader aspects of the court's decision: The commission as a rate-reviewing rather than a rate-making body," Chanler said:

"While Mobile's and Sierra's contentions were based primarily on the plain language of the Act, the three petitioners presented three different arguments in an attempt to show that, because of their conception of the nature of the so-called 'filed rate system' which they contended was embodied in the Act, the Act must be so construed as to outlaw rate contracts.

"United (Gas Co) contended that it was under a continuing duty to change rates so as to keep them always at a level to produce a 'fair return'; Sierra contended that it was the commission's duty at all times to fix rates at the precise point which the commission believed to be 'reasonable' regardless of whether the rate fixed by the parties might also be reasonable. The commission advanced its concept of the 'filed rate system' as authorizing changes of any rates by the unilateral action of the companies under S4 and the changing of rates by the commission after a finding of unreasonableness under S5.

"Judge Harlan's opinion in the Mobile case disposes of all these contentions by the sweeping assertion that the primary duty of the commission is not to fix or change rates but to review rates fixed by the companies, that the power of the companies to fix rates in the first instance remained unchanged by the Act, and that rates so fixed by companies, whether long in existence or newly filed as 'rate changes' could only be set aside by the commission if they were found to be unreasonable after a hearing as prescribed in 5(a).

Rate of Return Questioned

"In other words, the commission is not primarily a 'rate-making', but a 'rate-reviewing', body. This casts the Commission's functions in a very different light than that which has generally been accepted.

"The Commission appears to have been operating more or less on the theory that it was its duty to determine what was a reasonable rate of return for a given service and to reject all fixed rates which produced a higher or lower rate of return. Under Judge Harlan's decision the commission has no duty to fix a reasonable rate of return until it has found the rates filed by a company to be unreasonable.

"In other words, no rate filed by a company which is 'within the zone of reasonableness' may be disturbed by the Commission, even though the rate may be higher or lower than the precise rate which the Commission would itself fix, if it were fixing 'reasonable' rates," Chanler said.

This feature appears on this page every two weeks.

FUTURE FINANCING

(Furnished by the Irving Trust Co from the "Financing Calendar")

June is well filled with new issues. Electric and gas companies have scheduled $250 million security sales for this month. Common stock financing will be stepped up in June. The electric and gas utilities have already scheduled the sale of $70 million common stock offerings.

The day for the sale of big American Telephone & Telegraph Co $250 million debenture issue has been set.

Tuesdays are not the only day of the week available for competitive bidding. More and more companies are now using Monday. However, Wednesday is still a good day and is rarely used.

Due Diligence Meetings:
June 15, Public Service Co of New Hampshire; June 15, Western Massachusetts Companies; June 28, Elizabethtown Water Co; July 9, Florida Power Corp; July 13, Union Electric Co; and July 18, Consolidated Natural Gas Co.

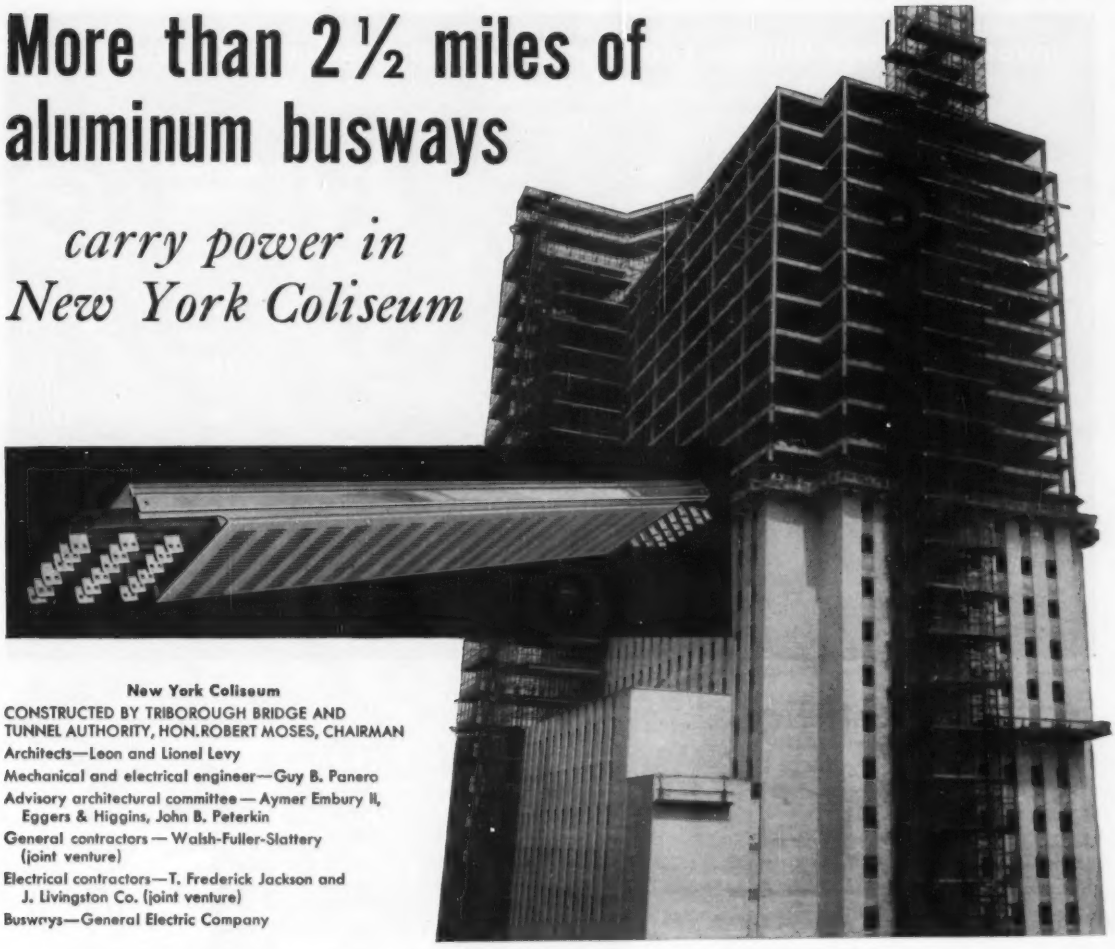
DATE	COMPANY	Amount of Offering (millions) DEBT	EQUITY
JUNE			
4	Milwaukee Gas	$13.0-C	$ .....
4	Potomac Electric Power	10.0-C	.....
4	U. S. Plywood	15.0-N	.....
5	New York City Schools	30.0-C	.....
5	Commonwealth Edison	40.0-C	.....
5	Potomac Electric Power	.....	6.0-N COM
6	Delaware Power & Light	.....	8.0-C-rt COM
6	Braniff Airways	.....	15.0-N-rt COM
6	Southern Pacific	9.7-C	.....
7	Connecticut Power	.....	5.2-N Pfd
7	Southern Union Gas	10.0-N	4.0-N Pfd
7	Indianapolis Power & Light	10.0-C	.....
11	National Gypsum	.....	20.0-N-rt COM
12	California Electric Power	.....	4.4-C COM
13	California Veterans	50.0	.....
18	Pacific Gas & Electric	.....	40.0-N-rt COM
19	Public Service of New Hampshire	8.0-C	.....
19	Western Massachusetts	.....	4.0-rt COM
25	Boston Edison	.....	18.0-C-Pfd
JUNE			
No Date	Jersey Central Power & Light	9.0-C	.....
	Household Finance	50.0-N	.....
	Atlanta Gas Light	.....	2.0-rt COM
	C.I.T. Financial	75.0-N	.....
	Washington PUD	163.0-N	.....
	Connecticut Power	.....	2.7- -rt COM
2nd Quarter of 1956 (Month not indicated)			
	St. Regis Paper	.....	23.2- -rt COM
	City of Memphis—Power PLant	135.0-N	.....
	South Carolina Electric & Gas	.....	5.0-P-Pfd
	Dade County Florida	34.5-C	.....
	Central Vermont Public Service	1.8-N	0.7-N COM
	Northern Indiana Public Service	12.0	.....
	City of Dallas	40.7	.....
	Ohio Turnpike	550.0-C	.....
	Washington State Toll Bridge	227.0-C	.....
	Oklahoma Turnpike	63.0-C	.....
	Metropolitan Edison	.....	5.0-C-Pfd
	Federal Land Banks	60.0	.....
	Atlanta Gas Light	5.0-C	.....
	Western Kentucky Gas	6.0-P-R	.....
JULY			
10	American Telephone & Telegraph	250.0-C	.....
10	Elizabethtown Water	7.5-C	.....
11	Pacific Power & Light	.....	9.3-C-rt COM
11	Florida Power	20.0-C	.....
17	Union Electric Co	35/40.0-C	.....
25	Consolidated Natural Gas	30.0-C	.....
JULY			
No Date	Florida State Turnpike Authority	185.0-N	.....
	Tennessee Gas Transmission	30.0-N	.....
AUG.			
15	U. S. Governments	12,500.0-R	.....
SEPT.			
11	Carolina Power & Light	15.0-C	.....
17	U. S. Governments	1/6,200.0-R	.....
25	Virginia Electric & Power	20.0-C	.....
SEPT.			
No Date	Southern Counties Gas	15.0-C	.....
	Pennsylvania Tunnel	25.0-C	.....
3rd Quarter of 1956 (Month not indicated)			
	Ohio Power	28.0-C	.....
	California Toll Bridge	34.0-C	.....
	South Carolina Electric & Gas	5.0-P	.....
	Consumers Power	30.0-C	.....
	Northern States Power	20.0-C	.....
	Rochester Gas & Electric	.....	5.0-N-Pfd
	Tampa Electric	10.0	.....
	Texas Eastern Transmission	.....	15.0-N-Pfd
	Detroit Edison	60.0-C-cv-rt	.....
	U. S. Governments	2/4,000.0*	.....
	Kansas-Nebraska Natural Gas	5.5-P	.....
OCT.			
2	Columbia Gas System	30.0-C	.....
16	Public Service of Indiana	30.0-C	.....
OCT.			
No Date	Delaware Power & Light	.....	6.0-C
	New England Power	10.0-C	.....
	North-South Indiana Toll Road	220.0-C	.....
	California Electric Power	6.0-C	.....
NOV.			
No Date	Transcontinental Gas Pipe Line	20.0-P	.....
	Long Island Lighting	20/25.0-C	.....

Symbols: C—Competitive; N—Negotiated; P—Private; R—Refunding; cv—convertible; rt—Rights; Pfd—Preferred; COM—Common.

* Estimated.

More than 2½ miles of aluminum busways

carry power in New York Coliseum



New York Coliseum
CONSTRUCTED BY TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY, HON. ROBERT MOSES, CHAIRMAN
Architects—Leon and Lionel Levy
Mechanical and electrical engineer—Guy B. Panero
Advisory architectural committee—Aymer Embury II, Eggers & Higgins, John B. Peterkin
General contractors—Walsh-Fuller-Slattery (joint venture)
Electrical contractors—T. Frederick Jackson and J. Livingston Co. (joint venture)
Busways—General Electric Company

Important Innovations in Coliseum

New York City's new Coliseum is modern in every detail, particularly in its electrical distribution system. This 26-story office building, combined with 365,000 square feet of display space, has one of the first major installations of a higher voltage distribution system (480Y/277 volts). More than 2½ miles of busway incorporating aluminum conductors were used to feed power to this huge structure.

Higher Voltage System Saves Money

The higher voltage system provides greater capacity and flexibility than conventional systems. Yet it requires only half as many, or half as large, risers and feeders. Characteristics such as excessive voltage drop or costly power losses present no problems to this system. The use of lightweight aluminum bus bars makes the equipment easier to handle and easier to install.

More and more manufacturers of packaged electrical distribution systems are finding that Alcoa® Aluminum Bus Conductor offers advantages of lower cost, availability, design flexibility. Aluminum distribution bus weighs a third less than a copper system of equal conductivity. Pound for pound, it has greater current-carrying capacity than cable in conduit.

Alcoa Aluminum Is Your Best Bet, Too

Wherever your production requirements demand an efficient, flexible electrical distribution system, it will pay you to specify busways with Alcoa Aluminum Conductors. Write us for the names of manufacturers who specialize in this lighter, better, more economical product. Aluminum Company of America, 2306-F Alcoa Building, Pittsburgh 19, Pa.

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THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

STATISTICS

Investor-Owned Utilities Lead the Way in Hydroelectric Development

Undeveloped Hydro Capacity Requiring FPC Major Licenses† (1,000 Kw)

		Investor-Owned	Other Industry	Cooperatives	Municipals	Non-Federal Government	Total
Projects under license	Under construction*[1]	1,990	52	0	251	999	3,292
	Not yet under construction*	1,763	0	117	386	1,919	4,185
Licenses applied for		3,110	40	6	160	1,656	4,972
Under preliminary permits		1,065	0	132	609	967	2,773
Applications for preliminary permits		512	0	0	199	1,202	1,913
Total		8,440	92	255	1,605	6,743	17,135

Notes: † Status as of April 30, 1956
* Figures shown are capacities authorized by licenses, but not yet installed.
[1] Or scheduled to start in 1956.

Source: Based on a study by Edison Electric Institute

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity, Peak—Class I Systems, Estimated Dec. '56 Peak	million kw	Mar. / Feb. / Mar.	92.3 / 94.2 / 105.68	94.2 / 95.8 / 105.56	83.4 / 83.8 / 103.41	10.7 / 12.4 / 2.2
Production—billion kwhr		Mar.	50.34	47.99	44.45	13.3
Hydro			11.78	10.63	10.40	13.3
Fuel			38.56	37.36	34.05	13.2
Sales—billion kwhr		Feb.	45.41	46.32	39.99	16.5
Residential			13.02	13.41	11.66	11.7
Commercial			6.89	7.00	6.20	11.1
Industrial			23.21	23.57	19.03	22.0
Other			2.28	2.34	2.10	8.6
Fuel Consumption		Mar.				
Coal—million tons			13.39	13.44	11.51	16.3
Oil—million barrels			6.22	7.10	6.81	−8.7
Gas—billion cu ft			85.17	67.81	83.41	2.1
Net Income Class A & B Co's—$ million		Feb.	129.67	127.26	120.21	7.9
Residential Customers—millions		12 mos.	44.60	44.51	43.34	2.9
Revenue per kwhr		ended	2.63¢	2.64¢	2.68¢	−1.9
Avg kwhr per customer		Feb. 29	2,799	2,778	2,587	8.2
Avg annual bill			$73.67	$73.34	$69.33	6.3

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	April	143	143	138	3.6
ENR Construction Cost	May	144.4	143.2	137	5.4
BLS Cost-of-living	Mar.	114.7	114.6	114.3	0.4
NEMA Sales	Mar.				
Insulation materials		168	163	160	5.0
Electric appliances		120	109	117	2.6
Wholesale prices	Feb.				
Motors and generators		126.6	126.5	121.0	4.6
Transformers and regulators		131.2	131.2	127.8	2.7
Switchgear and fuses		147.5	147.5	135.4	8.9
GNP—annual rate—$ billion	1st. Qtr.	398.5	397.3	375.3	6.2

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